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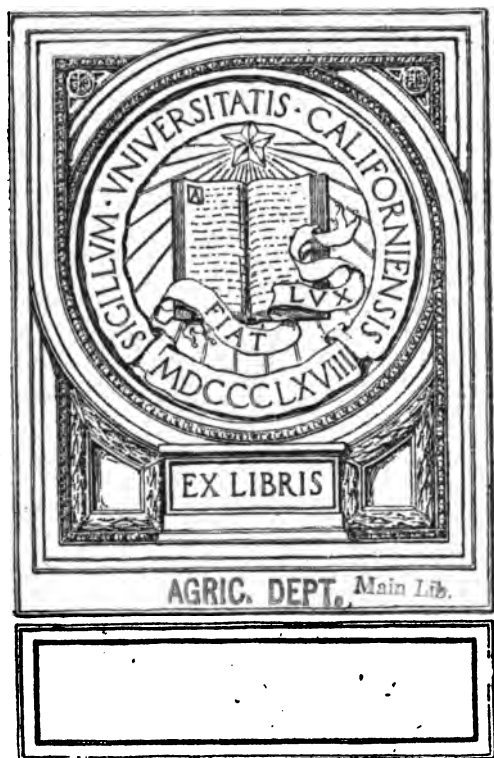
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EXERCISES IN  
AGRICULTURE  
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# EXERCISES IN AGRICULTURE

BY

S. H. DADISMAN

DIRECTOR OF PRACTICE TEACHING AGRICULTURE, IOWA STATE COLLEGE  
OF AGRICULTURE AND MECHANIC ARTS, AMES, IOWA

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## PREFACE

The exercises contained in this book have been tried in high schools by the author. They are recommended for the laboratory work in a one-year course in agriculture. There should be two laboratory periods each week for this work if possible. The value of having each pupil do the individual exercises cannot be over-emphasized. Seeing and noting the results, is believing, in laboratory work. These exercises should accompany the regular class work.

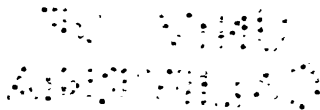
The exercises selected are simple and practical, and require but little equipment. Many such exercises have been tried out by the author, in his practice teaching work in agriculture. All those that have been found too difficult for the practice teacher to perform have been eliminated, so that the ones here given can be taught by the average high school teacher. The teacher can select from this list the ones that are best suited to the local conditions.

Every exercise in this book can be performed in the average high school with a limited amount of equipment. The equipment should be sufficient, however, for the size of the class. No pupil can perform exercises without the needed equipment any more than a mechanic can do his work without tools.

The suggestions for this work came from various sources, such as the Ames School Circular No. 2, from which the suggestions on corn were taken; and the Farm Crops and Poultry Departments Score Card, Iowa State College. The larger part of the material was gathered by the students in the practice teaching class in agriculture. The author wishes to express his thanks to these students for their help.

S. H. D.





## SUGGESTIONS

1. All exercises should be recorded as soon as they are performed.
2. The drawings, while not intended to show artistic display, should be neatly and accurately made.
3. Use a hard pencil in making drawings, and ink the drawings in after they have been corrected by the teacher.
4. Label all parts that can be shown in the drawing.
5. Make the drawings large. Where more than one drawing is on a page, make them in comparative sizes.
6. The notes should be brief and written in ink.
7. Textbooks and bulletins on agriculture should be consulted before the notes are written, in case of doubt.
8. A general textbook on agriculture should be used in the class work.
9. Such books as there may be in the school library on the special topics treated herein, will be found very helpful for reference in connection with the laboratory work outlined.

## APPARATUS AND MATERIAL

### MINIMUM LIST OF APPARATUS AND MATERIAL FOR HIGH SCHOOL AGRICULTURE

Recommended by the Department of Public Instruction  
State of Iowa, 1915, for a Class of Ten Pupils

The following apparatus will serve a class of 10 pupils.  
It should be ordered in advance.

- 1 laboratory table for class room, 6 x 3 ft., or larger.
- 1 case for storing apparatus (may be made to order at slight expense, if necessary).
- 1 Harvard trip scale.
- 1 set brass weights, in block, 1 g. to 500 g.
- 1 set iron weights,  $\frac{1}{2}$  oz. to 2 lb.
- 1 set fractional weights, German silver, 1 mg. to 500 mg.
- 1 spring balance, 25 lb.,  $\frac{1}{2}$  lb. divisions.
- 1 set five soil sieves, wood frame, 20-40-60-80-100.
- 2 thermometers, chemical, 10 degrees to 110 degrees, C. and F., engraved stem.
- 1 Babcock milk tester, 8 bottles complete.

Extra equipment for same:

- 4 milk bottles, 2 cream bottles (50%), 2 skim milk bottles (1-100).
- 4 acid measures, 4 pipettes (combined) 4 brushes.
- 1 lactometer (Quevenne's combined with thermometer).
- 1 hydrometer jar, 15 x 2 in.
- 1 soil auger, 40 x  $1\frac{1}{2}$  in.

- 5 Universal soil tubes, 12 in., brass, interchangeable bottom.
- 1 pruning saw, flat steel back,  $18\frac{1}{2}$  in.
- 2 hand pruners.
- 10 grafting knives, non-folding,  $6\frac{3}{4}$  in.
- 5 alcohol lamps, 8 oz.
- 5 tripod magnifiers.
- 2 glass tubes, 2 in. in diameter, 36 in. or more long.
- $\frac{1}{2}$  lb. soft glass tubing,  $\frac{1}{4}$  in.
- $\frac{1}{2}$  lb. glass rod,  $\frac{1}{4}$  in.
- 6 ft. rubber tubing,  $\frac{1}{4}$  in.
- 12 rubber stoppers, 2-hole. (2 No. 8; 3 No. 7; 3 No. 6;  
2 No. 4; 2 No. 2.)
- 12 wide-mouth bottles, 8 oz.
- 12 wide-mouth bottles, 2, 4, and 6 oz., assorted.
- 48 vials, straight walls, 3 in. long, with corks and labels.
- 1 gross assorted corks.
- 2 graduates, 100 cc. each.
- 72 test tubes,  $6 \times \frac{3}{4}$  in.
- 5 test tube brushes.
- 1 test tube rack, 16 tubes, 8 drying pins.
- 10 evaporating dishes, 3 in. diameter.
- 1 package filter paper, 15 cm. diameter.
- 2 vials litmus paper, 100 strips each, blue.
- 2 vials litmus paper, 100 strips each, red.
- 1 set liquid measures,  $\frac{1}{2}$  pt. to 1 gallon, tin.
- 1 set dry measures, 1 qt. to  $\frac{1}{2}$  bu., wood.
- 2 ring stands, rectangular base, 18 in. rod, 3 rings each.
- 10 student-lamp chimneys.
- 1 tape measure, 50 feet.
- 5 tape measures, 5 ft. plain linen without case.

12 flower pots, 4 in., with saucers, 6 in.  
1 insect mount, 4 x 5 in.  
20 earthen saucers.  
10 garden trowels.  
1 quart formalin preservative, 40%.  
1 pound grafting wax.  
1 pound hydrochloric acid.  
1 pound nitric acid.  
Fertilizers, insecticides, fungicides, and other chemicals,  
to suit the needs of the work as planned by the instructor.  
Soil samples from Department of Soils, State College of  
Agriculture.  
Samples of seeds of grasses.  
Type samples of grains.  
Head or sheaf of each grain.  
1 compound microscope, 2 eye-pieces, 2 objectives, double  
nose-pieces. (Spencer 66D, Bausch and Lomb BH4,  
or equivalent.)  
12 microscope slides, blank, 75 mm. x 25 mm.  
 $\frac{1}{2}$  oz. cover glasses, No. 2 round, 18 mm. diameter.  
(Where schools can afford it, it is strongly recommended  
that a Torsion Balance, for testing cream and determining  
the amount of moisture in butter, be added to the list above.)

#### SUGGESTIONS

To the above list should be added samples of the different grains and seeds of the common weeds found in the community. These can usually be secured from the agricultural experiment stations. The weed seed furnished by the United States Department of Agriculture may be secured

by addressing Seed Laboratory, U. S. Department of Agriculture, Washington, D. C. When sending for them it is also necessary to send \$1.75 to Mackall Bros. 9th and H Street, N. E., Washington, D. C., to pay for the trays and vials used in packing the collection.

The University of Nebraska has a free catalog of agricultural samples of type seeds, grasses, etc., all nicely mounted for sale.

Samples of soil, local weed seed, and grains can be gathered and stored for use in the early fall. The manual training department can make the trays for testing corn.

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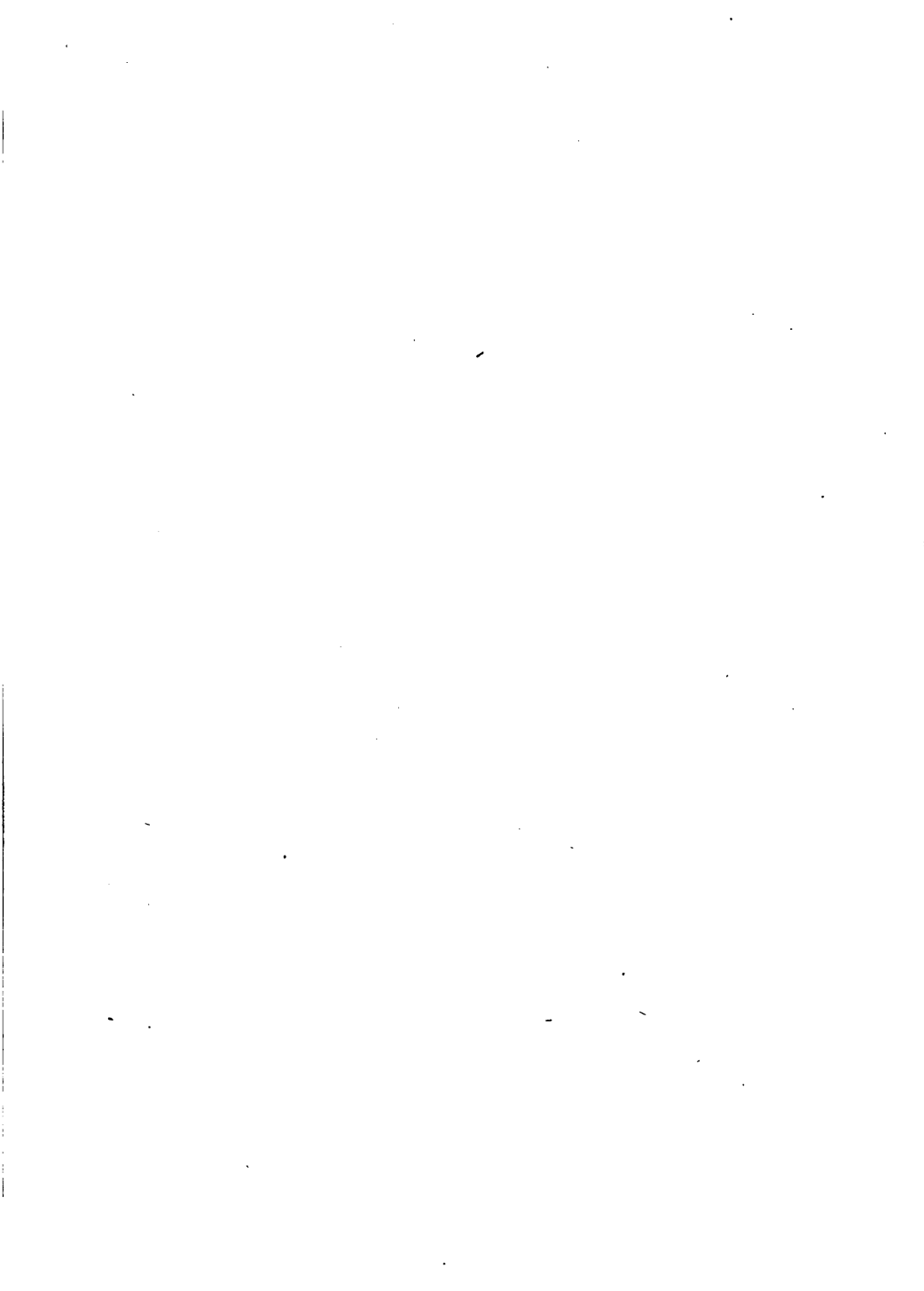
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# EXERCISES IN AGRICULTURE

## EXERCISE No. 1

### ESTIMATING THE STAND OF CORN

**Object:** To determine the per cent of the stand of corn in a field.

**Material:** Cornfield and yard stick or rule for measuring.

**Method:** Take a trip to the field where the corn is growing. The students should work in pairs. If the corn is planted in check rows, each group of two students should select a part of the field ten hills each way on which a fairly representative crop is growing. One of the students should measure the ground covered by the hundred hills, to determine what part of an acre it is, measuring from the first to the eleventh hill both in determining length and in determining width. The other pupil should count the stand of corn in each hill, making a record like that shown herewith. The per cent of stand

3	2	3	0	2	3	3	0	2	3
2	0	3	3	3	2	2	3	3	0
3	2	2	3	0	3	2	3	3	3
3	1	2	2	3	3	2	1	2	3
1	3	3	3	3	0	2	1	3	3
0	2	3	3	2	1	2	3	3	3
3	3	2	2	3	2	3	0	1	1
3	3	0	3	1	3	3	3	2	0

SAMPLE FORM FILLED

should then be determined. For the purpose of this computation, consider that there should be three stalks to each hill. (This figure will vary from 4 to 2 in fields of more or

less productive capacity.) Find out how many stalks there would be to the acre in a perfect stand. Then find out how many stalks there are to the acre based upon the number of stalks counted in the hundred hills, and what per cent of a perfect stand this is. Make this test in four places in the field, and average the four percentages.

If the corn is not planted in check rows, but in drills, select a part of the field 10 rows wide and 35 feet long. Instead of counting by hills count by  $3\frac{1}{2}$ -foot lengths in the row, assuming that a perfect stand has three stalks to every  $3\frac{1}{2}$  feet in the row. Proceed as described above for check rows. Make four tests and average them.

After returning to the schoolhouse determine the per cent of stand for the field by averaging the separate per cents found by all the groups of students.

1. How many suckers in the plot?.....Do they bear corn?.....
2. How many stalks have corn smut?.....How many stalks are injured by insects?.....
3. How many stalks have two ears?.....One?.....None?.....
4. How many seed ears in the plot?.....
5. Measure the distance between the hills; also between the rows. ....
6. Measure the height of the ears from the ground to the shank. ....
7. Measure the stalk from the ground to the tip of the tassel. ....
8. Based on your answer to question 3, how many ears would there be in an acre?.....

9. Weigh several ears, to determine the average weight per ear. How many bushels to the acre? (76 lb. to the bushel).....
10. Was the corn crop well cared for?.....
11. Make a list of the weeds found in the field. ....
- .....
12. What was the color of the soil?.....What kind of soil was it?.....

**Conclusion:** In what ways do you think that the stand and the yield of the corn could be improved?.....

.....

.....

.....

.....

## EXERCISE No. 2

### MACHINERY USED IN CONNECTION WITH CORN CROP

**Object:** To learn the most economical kinds of machinery used in raising and harvesting the corn crop.

**Material:** A hardware store where practically all kinds of farm machinery are kept.

**Method:** Visit the hardware store with a note book in hand. After the good and bad points of the machinery have been explained, make a record of all the good points of the different kinds of machinery used in the cultivation and harvesting of the corn crop. After the class discussion, this exercise should be written in the laboratory note book. The notes should begin with the fall plowing and should discuss the best kind of machinery to use in connection with the corn crop until the corn is harvested and in the corn crib.

**Conclusion:** The economic value of the best machinery.

[illegible]

## EXERCISE No. 3

### A STUDY OF THE CORN STALK

**Object:** To become familiar with the different parts of the stalk of corn and of the rooting system.

**Material:** Stalks of corn showing rooting system. These should be green, with as much of the root on them as it is possible to get.

**Method:** Draw in detail the mature corn stalk including the rooting system. Label each part. Also draw a poor stalk and label it to show the contrast. Label one stalk of corn desirable and the other undesirable.

**Conclusion:** How could the poor stalk have been improved?.....

.....

.....

.....

.....

.....

## EXERCISE No. 4

### A STUDY OF THE CORN KERNEL

**Object:** To become familiar with the different parts of the kernel of corn.

**Material:** Good and poor kernels of corn for comparison, and a hand lens. The corn should be soaked in warm water for an hour before being used for this exercise.

**Method:** Draw an outline of the kernel as it lies on the desk, germ side up. The drawing should be made  $3\frac{1}{2}$  inches long. Carefully remove the tip cap of the kernel with a knife. Locate the tip cap in the drawing, and label it.

(a) Carefully remove the hull with a knife, in one piece if possible. Label the hull in the drawing.

(b) Scrape off the mealy layer (aleurone) which constitutes the second covering of the kernel. It is usually much thicker than the hull. Make a shady line next to the hull for the aleurone layer, and label it.

(c) Carefully remove the germ (embryo), which is found in the center of the front of the kernel and toward the tip. It extends from  $\frac{1}{2}$  to  $\frac{2}{3}$  of the length of the kernel. The germ is rich in fat and oil. The embryo stem points toward the crown and the embryo root points toward the tip of the kernel. Both of these are parts of the embryo. Show this in the drawing.

(d) Break the remainder of the kernel (the endosperm) into two parts, lengthwise. Scrape the white starchy portion off the horny starch portion. The white starchy portion occupies the crown end of the kernel above the germ and it also surrounds the germ toward the tip. See if you

can separate these into parts, the crown starch and the tip starch. Show these parts in the drawing, and label them.

(e) Lay a kernel on the desk germ side up and cut it into two equal parts. Make an enlarged drawing of the cut surface labeling each part.

(f) Cut a kernel flatwise. With a drop of iodine test it for starch. The iodine will turn blue the portion that contains the starch.

Draw and label to show where the starch is located.

**Conclusion:** Which part of the corn do we try to develop?  
**Why?**

.....

.....

.....

.....

.....



## EXERCISE No. 5

### STUDYING BUTTS AND TIPS

**Object:** To learn to recognize an ear of corn with good butt and good tip.

**Material:** Several samples of butts and tips of corn.

**Method:** After becoming familiar with good butts and tips and poor butts and tips, make careful drawings to illustrate each. Be sure that the drawings are labeled. Make drawings from the butts and tips studied in class.

**Conclusion:** State what constitutes a good butt and a good tip.

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## EXERCISE No. 6

### SELECTING SEED CORN

**Object:** To learn how and when to select good seed corn.

**Material:** A field of corn.

**Method:** After the desirable points of a good seed ear have been studied in class go into a corn field and let each member of the class select five good seed ears, if enough can be found. These ears should be marked so that the pupils can easily find them. Each stalk and ear selected should be discussed and reasons given for its selection. It should be

remembered that a good seed ear is on a stalk of the proper size and shape with the grains mature enough to insure their growth. The class can then decide whether or not it is a desirable seed ear. A stalk bearing a good seed ear should be brought to the class room for future study.

**Conclusion:** A brief description of a good seed ear and of the stalk on which it grew, telling how and when to select seed corn.



A PILE OF GOOD EARS

.....

.....

.....

.....

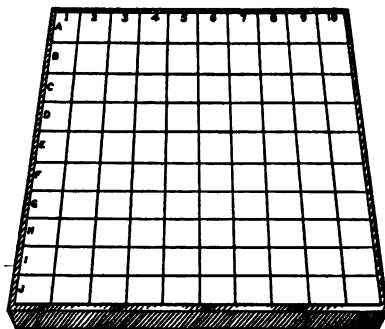
**EXERCISE No. 7**  
**TESTING SEED CORN**

**Object:** To learn how to test seed corn.

**Material:** Seed corn on the ear, germinating box, and the rag doll tester.

**Method:** Make a box 20 inches square on the inside and 3 inches deep. Divide it into 2-inch squares by sawing into the top  $\frac{1}{2}$  inch and running strings through the cuts made by the saw. Label it A, B, C, D, etc., one way, and 1, 2, 3, etc., the other way. Label the ears of corn to correspond; that is, A1, A2, B1, B2, C1, etc.

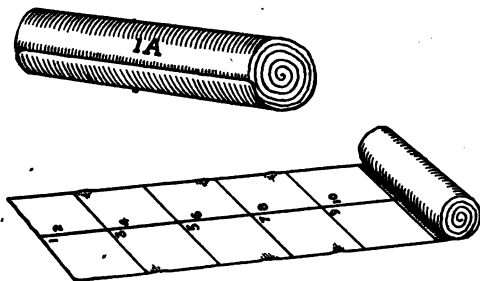
Fill the box with saw-dust or sand and place the kernels in it according to the way the ears are numbered. Six kernels should be taken from each ear, two from the middle, two from near the tip, and two from near the butt. These kernels should not be taken from the same



GERMINATING BOX

place on the ear. After the kernels have been placed in the box, the box should be covered with a cloth. It should be watered so that the corn will start to grow.

To prepare the rag doll tester: Take a strip of muslin about 5 feet long and 9 inches wide. Draw a heavy line lengthwise through the middle of the strip. Draw lines about 3 inches apart at right angles to the first line, dividing the strip into squares. Number the squares and the rows the



RAG DOLL TESTER

same as in the box tester. Select the kernels in the same way and lay them in the squares, germ side up and the tips pointing outward. Roll the muslin up and soak it in warm water for about 8 hours. Then drain the tester and put it away. Examine the tester in about 3 days.

After the testers have been left for about 5 or 6 days take the corn kernels out and find what per cent germinated strong, what per cent weak, and what per cent are dead.

#### GERMINATION TEST

No. OF EAR	STRONG	WEAK	DEAD

Both of these methods should be used unless it is thought that the rag doll is the only one that will be used in the community.

**Conclusion:** The per cent of the kernels that germinated was..... The samples tested showed.....% strong, .....% weak,.....% dead. No corn should be planted unless it germinates 100%.

#### EXERCISE No. 8

#### SCORING SINGLE EARS OF CORN

**Object:** To be able to make use of a score card in judging corn.

**Material:** Ten single-ear samples of corn and a score card like the model.

**Method:** Score the ten ears selected according to the score card. Be able to give reasons for the points placed on the score card. When in doubt, consult the teacher. When the ears are scored, at the end of the period, record the teacher's total scores and compare them with your totals. See form on page 26.

### SCORE CARD FOR CORN (Single Ears)

Variety ..... Standard Length.....  
 Sample Number..... Standard Circumference.....

CHARACTERISTICS OF GOOD CORN	Perfect Score	NUMBERS OF EARS									
		1	2	3	4	5	6	7	8	9	10
I. Variety type.....	10										
II. Purity of kernels.....	5										
III. Maturity and soundness.....	15										
IV. The ear:											
(a) Length.....	10										
(b) Circumference.....	5										
(c) Shape.....	10										
(d) Butt.....	5										
(e) Tip.....	5										
V. The kernels:											
(a) Size and shape.....	10										
(b) Uniformity.....	5										
(c) Spacing between rows and between kernels.....	5										
(d) Size and condition of germ.....	10										
VI. Size of cob.....	5										
<b>TOTAL.....</b>	<b>100</b>										

## Explanation

**UNIFORMITY OF TYPE.** The ear should conform to the general type of the variety in respect to (1) color of corn; (2) color of cob; (3) width, thickness, depth, and shape of kernels; (4) indentation of kernels; (5) arrangement and spacing of rows; and (6) size and shape of the ear as a whole and also of the butt and tip. When the variety is not known the perfect score should be recorded.

**PURITY OF KERNELS.** Kernels should be free from mixture. Deduct one-half point for each kernel showing opposite color, and if in competition, ten or more mixed kernels shall bar the ear.

**MATURITY AND SOUNDNESS.** The ear shall be well matured, dry and firm when twisted, and of good weight for size and condition. Sappiness, mouldiness at the crowns of the kernels and at the cob, looseness of corn on cob, chaffiness, extreme starchiness, badly shrunken kernel tips, blistered or shriveled kernel backs, adherence of tip caps to cob, and of considerable chaff to the tips of the kernel are indications of immaturity.

**THE EAR:** (a) Length. The standard length varies with the section of the state and the variety. The average measurement which will apply to different sections is 9 to 10 inches. Deduct at the rate of one point for each quarter inch short of the standard length.

(b) Circumference. Measure the circumference one-third the distance from butt to tip. The standard circumference is 7 to  $7\frac{1}{2}$  inches. For each one-quarter inch variation from the standard, deduct one point from the full score.

(c) Shape. In general a well shaped ear should (1) be nearly cylindrical; (2) have straight rows running directly from butt to tip; (3) be full and strong in the middle portion; (4) not be flattened throughout any part of its length.

(d) Butt. The butt should carry out the circumference of ear uniformly, and not be pinched, enlarged, expanded, or flattened. It should be well rounded out with straight rows of regular kernels, having nearly the same depth, width, thickness, and shape as the body kernels. The corn should be uniformly arranged around a medium sized, cup-shaped cavity.

(e) Tip. The tip should be covered to the end of the cob with kernels arranged in straight rows and having nearly the same size and shape as the body kernels. Shallow, narrow, irregular, glistening, and shot-shaped kernels are objectionable.

**THE KERNEL:** (a) Size and Shape. Size of kernels includes depth, width, and thickness. Depth varies with climate and variety. For average conditions a medium depth ordinarily produces the largest yield of mature corn. Width, thickness, and shape vary with varieties. In general, kernels should be keystone-shaped, with plump and well developed tips. Kernels of

this shape have sufficient room for germ development and increase the shelling percentage. Pointed, shoe-peg, and rectangular kernels should be discriminated against. In thickness the kernels should number about six to the inch in the row.

(b) Uniformity. Odd shaped and irregular kernels throughout the body of the ear are objectionable. Kernels should be uniform in depth, width, thickness, and shape.

(c) Space Between Rows and Between Kernels. Large open spaces between rows either at the crowns or tips of kernels, or between the kernels in the same row, are objectionable. There should be only sufficient space to permit satisfactory drying of the ear.

(d) Size and Condition of Germ. The germ should be long, wide, and thick. Cut through the kernel from tip to crown parallel to the edges to get an idea of the thickness of the germ. The germ should be smooth and bright, not shriveled, blistered, shrunken, mouldy, or discolored. The embryo proper should show a fresh, oily, and live appearance and be whitish in color. Cut a longitudinal section parallel to the width of the kernel so as to expose the embryo to view.

**SIZE OF COB.** Size of cob varies with the variety and the locality in which the corn is grown. For average conditions a medium-sized cob is most desirable.

PLACING	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
Pupil's placing.....										
Teacher's placing.....										
Pupil's No. of points off..										
Teacher's No. of pts. off..										

.....Pupil's Grade

## EXERCISE No. 9

### SCORING TEN-EAR SAMPLES OF CORN

**Object:** To learn to score ten-ear samples of corn.

**Material:** Ten-ear samples of corn and score cards.

**Method:** These samples should be placed on the table

and two kernels taken from each ear and placed in front of the ears from which they were taken. Scoring can then be done according to the score card that is given.

### SCORE CARD FOR CORN (Ten-Ear Samples)

Variety ..... Standard length.....  
 Sample number ..... Standard circumference.....

CHARACTERISTICS OF GOOD CORN	Perfect Score	NUMBERS OF SAMPLES						
		1	2	3	4	5	6	7
I. Uniformity of variety type....	10							
II. Purity of kernels.....	5							
III. Maturity and soundness.....	15							
IV. The ears:								
(a) Length.....	10							
(b) Circumference.....	5							
(c) Shape.....	10							
(d) Butt.....	5							
(e) Tip.....	5							
V. The kernels:								
(a) Size and shape.....	10							
(b) Uniformity.....	5							
(c) Spacing between rows and between kernels.....	5							
(d) Size and condition of germs.....	10							
VI. Size of cobs.....	5							
TOTAL.....	100							

### Explanation

**UNIFORMITY OF VARIETY TYPE.** The ears should conform to the general type of the variety in respect to (1) color of corn; (2) color of cob; (one ear with a cob of distinctly opposite color will be sufficient reason to bar the sample if in competition); (3) Width, thickness, depth and shape of kernels; (4) indentation of kernels; (5) arrangement and spacing of rows; and (6) size and shape of the ears as a whole and also of the butts and tips.



**PURITY OF KERNELS.** Kernels should be free from mixture with corn of opposite color. Deduct one-eighth point for each kernel distinctly showing opposite color.

**MATURITY AND SOUNDNESS.** Ears should be well matured, dry, firm when twisted, and of good weight for size and condition. Sappiness, mouldiness at the crowns of the kernel and at the cob, looseness of corn on cob, chaffiness, extreme starchiness, badly shrunken kernel tips, blistered or shriveled kernel backs, adherence of tip caps to cob, and of considerable chaff to the tips are indications of immaturity. Deduct one-eighth to one point for each ear showing deficiency in any of the above points.

**THE EARS:** (a) Length. The standard length varies with the section of the state and with the variety. Average measurements are 9 to 10 inches. Add together the deficiencies in length of the different ears and deduct one-fourth point for each one-fourth inch in the total.

(b) Circumference. Measure the circumference one-third the distance from butt to tip. The standard circumference is 7 to  $7\frac{1}{2}$  inches. Add the deficiencies in circumference of all ears varying from the standard circumference and deduct one-eighth point for each one-fourth inch.

(c) Shape. In general, well shaped ears should (1) be nearly cylindrical; (2) have straight rows running directly from butt to tip; (3) be full and strong in the middle portion; and (4) not be flattened throughout any part of their length. Deduct from one-eighth to one point for each ear deficient in shape.

(d) Butts. The butts should carry out the circumference of the ears uniformly and not be pinched, enlarged, expanded, or flattened. They should be well rounded out with straight rows of regular kernels, having nearly the same depth, width, thickness, and shape as the body kernels. Deduct one-eighth to one-half point for each ear with a deficient butt.

(e) Tips. The tips should be covered to the end of the cobs with kernels arranged in straight rows and having nearly the same size and shape as the body kernels. Shallow, narrow, irregular, glistening, and shot-shaped kernels are objectionable. Deduct one-eighth to one-half point for each ear with an inferior tip.

**THE KERNELS:** (a) Size and Shape. Size of kernels includes depth, width, and thickness. Width, thickness, and shape vary with varieties. In general, kernels should be keystone-shaped with plump and well-developed tips. Pointed, shoe-peg, and rectangular kernels should be discriminated against. In thickness the kernels should number about six to the inch in the row. For each ear showing kernels deficient in size and shape deduct from one-eighth to one point.

(b) Uniformity. The kernels from the different ears should be uniform in depth, width, thickness, and shape in order to supply as much uniform corn as

possible. The individual kernels on each ear should also be uniform. Deduct one-eighth to one-half point for each ear with kernels differing from the prevailing type.

(c) **Space Between Rows.** Large open spaces between rows either at the crowns or the tips of the kernels, or between kernels in the same row, are objectionable. There should be only sufficient space to permit satisfactory drying of the ears. Deduct one-eighth to one-half point for each ear not showing proper spacing.

(d) **Size and Condition of Germs.** The germ should be long, wide, and thick. Cut through the kernels from tip to crown parallel to the edges to get an idea of the thickness of the germs. The germs should be smooth and bright, not shriveled, blistered, shrunken, mouldy, or discolored. The embryos proper should show a fresh, oily, and live appearance, and be a yellowish white in color. Deduct one-eighth to one point for each ear showing deficient germs.

**SIZE OF COBS.** Size of cobs will vary with the variety and the locality in which the corn is grown. Large cobs are objectionable because they indicate late maturity, slow drying and reduction in the proportion of shell corn to the cob. Small cobs are undesirable, being associated with low yield. The cob should be of a medium size.

## EXERCISE No. 10

### JUDGING CONTEST

**Object:** To become familiar with different samples of corn, so as to be able to select the best samples.

**Material:** As many ten-ear samples as can be conveniently placed on the judging table. These samples should be placed first, second, third, etc. Be able to give reasons for placing them as you do.

**Conclusion:** A written statement giving the reasons why they are so placed.

Select ears for the following points. Make such observations as will enable you to give actual score on the points enumerated.

- 
- This image shows a full page of white paper designed for handwriting practice. It features approximately 20 horizontal dashed lines spaced evenly across the page. There are no margins, text, or other markings present.

## EXERCISE No. 11

### WEIGHT OF EAR, AND NUMBER OF GRAINS IN BUSHEL

**Object:** To determine the weight of an ear, and the number of grains in a bushel of corn.

**Material:** A number of average ears of corn and a pair of scales that is accurate.

**Method:** Weigh ten average ears of corn, one at a time, each member of the class using a different sample of ten ears. Count the grains by counting the rows and the number of kernels in a row. These multiplied together will give the number of kernels in the ear. Verify the weight by weighing the ten ears together. How many ears in a bushel? How many kernels? What effect does it have on the number of kernels and the number of ears in a bushel if the ears are large? The averages are to be made from the samples of the entire class. Compare a weighed bushel with a measured bushel.

**Conclusion:** The average bushel of corn contains..... ears and has..... kernels. The average weight of an ear is.....

## EXERCISE No. 12

### A STUDY OF CORN ENEMIES

**Object:** To learn to recognize some of the most important enemies of the corn crop.

**Material:** A good hand lens, samples of corn smut, corn root worm, corn root aphid, corn ear worm, chinch bug, white grub, and other cut worms in their different stages.

**Method:** Make a careful study of each in the laboratory.

**Conclusion:** Make careful drawings of the more important ones and write short descriptions of the others. Tell how each may be controlled.

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### EXERCISE No. 13

#### GERMINATION TEST FOR SMALL GRAINS

**Object:** To find out what per cent of the common small grains will grow.

**Material:** Wheat, oats, rye, and barley kernels, blotting paper, and aluminum plate.



1



2



3



4

**Method:** Count 1.—WHEAT 2.—OAT 3.—RYE 4.—BARLEY  
out 100 grains of each  
of the following: Wheat, oats, rye, and barley. Wet four

pieces of blotting paper, each about 4 x 8 inches in size. Place 100 grains of wheat in one piece of paper, fold it to 4 x 4 inches, and lay it in the plate. Place each of the other grains in a separate paper and keep all in a moist place for three days. Then open the blotting paper and see what per cent of each has started to grow. Count those with a vigorous growth as strong; those just starting or of poor growth, as weak; those that have not started, as dead. If the class is not too large, let each pupil count two samples.

**Conclusion:** What per cent of wheat was strong?.....  
weak?.....dead?.....

Which samples were good enough to plant?.....

What per cent of oats was strong?.....weak?.....  
dead?.....total?.....

What per cent of rye was strong?.....weak?.....  
dead?.....total?.....

What per cent of barley was strong?.....weak?.....  
dead?.....total?.....

## EXERCISE No. 14

### PURITY TEST FOR SMALL GRAINS

**Object:** To find the per cent of pure seed.

**Material:** Samples of average wheat, oats, rye, and barley, and a pair of accurate scales.

**Method:** Measure out a half pound of each of the four grains. Carefully pick out all the weed seed, dirt, and other impurities. Weigh the pure seed.

**Conclusion:** The pure seed was .....% of the sample.  
The losses from impurities were as follows:

Wheat.....% weeds and dirt, or.....lb. per bu.

Oats.....% weeds and dirt, or.....lb. per bu.

Rye.....% weeds and dirt, or.....lb. per bu.

Barley.....% weeds and dirt, or.....lb. per bu.

### EXERCISE No. 15

#### DRAWINGS OF THE OAT HEAD

**Object:** To become familiar with the head of the oat plant.

**Material:** Heads of the oat plant.

**Method:** Make a detail study of the oat head in laboratory.



OAT  
SPIKELET

(a) Make a drawing to show panicle, awn, rachis, whorl, and spikelet.

(b) Draw an oat spikelet showing the outer glumes, outer hulls, awn, and undeveloped flower.

(c) What is the difference between an oat grain and an oat kernel?



OAT HEAD

**Conclusion:** What parts of the oat head should we strive to improve?.....

Why?.....

.....  
In what way does the size or maturity of the grain influence the number of bushels produced per acre?

.....  
The points of difference. ....

## EXERCISE No. 16

### DRAWINGS OF WHEAT OR BARLEY HEAD

**Object:** To become familiar with the different parts of the wheat or barley head.

**Material:** Heads of wheat or barley.

**Method:** Make a detailed study of the head in the laboratory.

(a) Draw a wheat or barley spikelet showing (1) beard, (2) grains, (3) rachis.



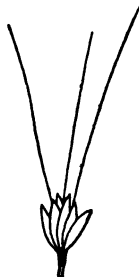
(b) Draw a wheat or barley spikelet showing (1) outer glume, (2) flowering glume, (3) awn.



RYE  
SPIKELET



BARLEY  
SPIKELET



WHEAT  
SPIKELET



WHEAT HEAD

**Conclusion:** In what way does the wheat or barley head differ from the oat head?.....

How does the size or shape of the head influence the yield?

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## EXERCISE No. 17

### A STUDY OF THE SMALL GRAINS

**Object:** To become familiar with the sizes and shapes of the kernels of common small grains.

**Material:** Samples of wheat, rye, barley, and oat kernels.

**Method:** Make drawings of the kernels of (a) wheat; (b) rye; (c) barley; (d) oats. Show 1st, grain; 2d, crease; 3d, hardness; 4th, comparative size. (Make the drawing of the wheat kernel at least an inch in diameter.)

## EXERCISE No. 18

### TREATING OATS FOR LOOSE SMUT

**Object:** To learn how to treat oats for loose smut.

**Material:** A peck of oats and 5 cc. of formalin. (The proportion to use is one pint of formalin to 40 gallons of water.)

**Method:** Add the 5 cc. of formalin solution to 1600 cc. of water. Pour the oats into a box and sprinkle them thoroughly with a quart of the solution. Stir the mixture with your hand or a stick until every kernel is thoroughly moistened. Cover with a gunny sack for five hours. Then remove the sack and spread the oats out until dry. Formalin is also used for treating potato scab.

**Conclusion:** What were the precautions in treating the oats with the formalin solution?.....

The reasons for this treatment.....

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.....  
.....  
.....

## EXERCISE No. 19

### SCORING GRAINS

**Object:** To be able to use a score card in judging seed.

**Material for Next Two Exercises:** Samples of oats, wheat, and barley and three score cards.

**Method:** Score each sample according to the special score card for that grain, as given in this exercise and the next.

## SCORE CARD FOR OATS

Use 100 grains for sample.

	Perfect Score	NUMBER OF SAMPLE					
I. Uniformity of type.....	15	.....	.....	.....	.....	.....	.....
II. Freedom from foreign matter.....	15	.....	.....	.....	.....	.....	.....
III. Soundness.....	30	.....	.....	.....	.....	.....	.....
IV. Proportion of kernel to hull.....	20	.....	.....	.....	.....	.....	.....
V. Weight per bushel.....	20	.....	.....	.....	.....	.....	.....
<b>TOTAL.....</b>	<b>100</b>	.....	.....	.....	.....	.....	.....

### Explanation

**UNIFORMITY OF TYPE.** The grain should be characteristic of the variety as shown by the size, shape, and color, and should also be uniform in these respects. Color refers to the natural hue, as white or yellow, hence discoloration of grains due to weathering should not be discriminated against under the heading **uniformity**. Differences in size, shape, and color of the grains usually indicate a mixture of varieties, and the sample should be cut according to the percentage mixture. When the variety characteristics are not known or considered, the sample should be scored only on uniformity of grains and not on variety characteristics. Deduct one point from the perfect score for each per cent of non-uniform grains in the sample.

**FREEDOM FROM FOREIGN MATTER.** Foreign matter includes everything in the sample that is not oats. This material may be classed under three general headings: (1) Weed seeds; (2) foreign grains; (3) inert material. Ordinarily, deduct one point from the perfect score for each four per cent of foreign matter.

**SOUNDNESS.** The grain should have a bright, lustrous appearance, and should show strong vitality. It should not be damp, stained, weathered, discolored, immature, musty, mouldy, smutted, hulled, badly broken, or sprouted. The general rule is to deduct one point for each two per cent of unsound grains.

**PROPORTION OF KERNEL TO HULL.** The plumper the kernel and the thinner and shorter the hull, the higher the proportion of kernel to hull. Large, plump, and well-developed kernels provide an increased amount of material for germination. The proportion of kernel depends on (1) maturity; (2) development; (3) variety; (4) section in which grown. To determine the pro-

portion of kernel to hull, weigh 100 representative grains. Then hull them and weigh the kernels. For each per cent which the weight of kernel lacks of being 70% of the whole, a deduction of two points should be made, and for each per cent above 70, one point should be added to the total score.

**WEIGHT PER BUSHEL.** Characteristics which indicate heavy weight per bushel are: (1) Medium-sized grains; (2) plump kernels; (3) thin, close-fitting, short hulls without awns. The weight of a bushel should be 32 lb. For each pound short of the standard, deduct one and one-half points from the perfect score. For each pound above the standard, add three-fourths of a point to the total score.

## EXERCISE No. 20

### SCORE CARD FOR WHEAT

Use 100 grains for sample.

CHARACTERISTICS OF GOOD WHEAT	Perfect Score	NUMBER OF SAMPLE					
I. Uniformity of type.....	15	.....	.....	.....	.....	.....	.....
II. Freedom from foreign matter....	20	.....	.....	.....	.....	.....	.....
III. Soundness.....	30	.....	.....	.....	.....	.....	.....
IV. Weight per bushel.....	20	.....	.....	.....	.....	.....	.....
V. Hardness.....	15	.....	.....	.....	.....	.....	.....
TOTAL.....	100	.....	.....	.....	.....	.....	.....

#### Explanation

**UNIFORMITY OF TYPE.** Spring wheat grains are shorter, stubbier, and usually have more angular grooves than those of the hard winter varieties. The grains should be characteristic of the variety, as shown by the size, shape, and color, and should also be uniform in these respects. Color refers to the natural hue, as white, light red, or amber; hence discoloration of grains due to weathering should not be discriminated against under the heading *uniformity*. Deduct one point from the perfect score for each four per cent of non-uniform grains in the sample.

**FREEDOM FROM FOREIGN MATTER.** Foreign matter includes every thing in the sample that is not wheat: (1) Weed seeds; (2) foreign grains; (3) inert

material. Ordinarily, deduct one point from the perfect score for each three per cent of foreign matter.

**SOUNDNESS.** The grain should be relatively large and plump, should have a bright, lustrous appearance, and should show strong vitality. It should not be damp, bleached, weathered, discolored, musty, decayed, sprouted, stack- or bin-burnt, shriveled, shrunken, broken, smutted, or insect injured. The general rule is to deduct one point for each two per cent of unsound grains.

**WEIGHT PER BUSHEL.** Plump, well-developed grains of medium size indicate a high weight per bushel; whereas shriveled and shrunken kernels indicate a low weight grain. Conditions of unsoundness, as mustiness, mouldiness, dampness, sprouted kernels, and results of exposure to inclement weather will lower the weight. Standard weight per bu.—60 lb. Ordinarily the greater the weight per bushel, the more desirable the grain for seed. For each pound short of the standard deduct one and one-half points from the total score. For each pound above the standard add three-fourths of a point to the total score.

**HARDNESS.** The degree of hardness depends upon (1) variety; (2) section in which grown; (3) growing conditions. Usually the more favorable the growing conditions the plumper and more starchy the grain. To get an idea of the hardness, several representative grains should be cut in cross-section. The dark red and flinty appearing grains are the most desirable, as they have a higher gluten content and produce an excellent quality of flour when milled.

## EXERCISE No. 21

### PURITY TEST OF LEGUMES

**Object:** To determine the per cent of pure seed in a given sample.

**Material:** Samples of about 100 seeds each of alfalfa, red, white, and sweet clover, and a hand lens.

**Method:** From the sample of each legume seed count out the pure seeds. A hand lens can be used to identify the seeds when in doubt. Estimate the per cent of pure seed, of weed seed, and of dirt. Write the names of all the weed seed found in the sample.

**Conclusion:** Pure seed.....weed seed.....  
dirt..... What is the result when impure seed is  
sown?.....  
.....  
.....  
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## EXERCISE No. 22

### GERMINATION TEST OF LEGUME SEEDS

**Object:** To find out what per cent of the legume seed will grow.

**Material:** Alfalfa, red, white, and sweet clover seed, soy beans, vetch, cowpeas, plate, and blotting paper. (Use as many of these samples as time will permit.)

**Method:** Count out 50 or 100 seeds of each sample. Take a piece of blotting paper 4 x 8 inches. Place the sample counted in the blotting paper after the paper is thoroughly wet. Leave it in a warm place for three days. Count the number of seeds that have made a vigorous growth, as strong; those just starting, as weak; and those that have not started, as dead.

**Conclusion:** .....% was strong.  
.....% was weak.  
.....% was dead.

Was the seed good enough to sow?  
.....  
.....  
.....  
.....

## EXERCISE No. 23

### DRAWINGS OF THE LEGUMES

**Object:** To study in detail the legume plants.

**Material:** Samples of alfalfa, red, alsike, crimson, sweet, and white clover, vetch, soy beans, and peanuts with both tops and roots.

**Method:** Make a careful drawing of each legume that can be secured, showing the stem, flower, and rooting system with nodules on the roots. Each drawing should cover one fourth of a page. Label each drawing in detail so as to bring out the characteristics of the plant.





ALFALFA



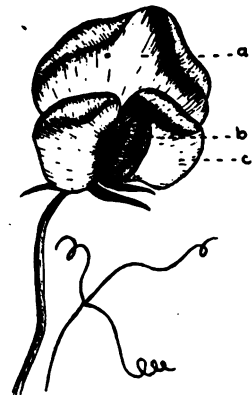
RED CLOVER



SWEET CLOVER



WHITE CLOVER



FORM OF FLOWER OF  
A LEGUME



## EXERCISE No. 24

### PURITY TEST OF NON-LEGUMES

**Object:** To find the per cent of pure seed in a given sample.

**Material:** Samples of about 100 seeds each of timothy, red top, blue grass, orchard grass, and any other grass seed that is commonly grown, and a hand lens.

**Method:** From each sample count out the pure seeds. Estimate the per cent of pure seed, of weed seed, and of dirt. Write the name of all the weed seed found in the samples.

**Conclusion:** Pure seed.....weed seed.....dirt.....

What is the result when impure seed is sown?.....

Which samples of seeds are good enough to sow?.....

.....

## EXERCISE No. 25

### GERMINATION OF NON-LEGUME SEEDS

**Object:** To find what per cent of non-legume seed will grow.

**Material:** Timothy, red top, blue grass, and orchard grass seed, a plate, and blotting paper.

**Method:** Count out 50 or 100 seeds from each sample. Take a piece of blotting paper 4 x 8 inches, place the selected seeds on blotting paper which has been thoroughly wet. Leave it in a warm place for three days. Count the seeds that made a vigorous growth as strong; those just starting as weak; and those that have not started as dead.



**Conclusion:** .....% was strong.  
.....% was weak.  
.....% was dead.

Was the seed good enough to sow?..... What effect  
does poor seed have on the amount of seed to sow?.....

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## EXERCISE No. 26

### DRAWINGS OF NON-LEGUME PLANTS

**Object:** To study in detail non-legume plants.

**Material:** Samples of both top and roots of non-legume plants such as timothy, red top, blue grass, orchard grass, and any other common grasses.

**Method:** Make a careful drawing of each, showing the stem, flower, and rooting system. Each drawing should cover a page. Label each drawing in detail so as to bring out the characteristics of that particular grass, as timothy to show the bulb at the base of the stalk.

**Conclusion:** Make a comparison of the grasses showing how they differ.











## EXERCISE No. 27

### A STUDY OF THE DIFFERENT TYPES OF HORSES

**Object:** To learn to locate the parts of a horse and to learn the difference between the draft horse and the road horse.

**Material:** A horse of the draft type, a horse of the road type, and a chart showing divisions and parts of the horse.

**Method:** Draw an outline of a horse. Go over the outline carefully, labeling the parts with their correct names as shown by the chart. With the outline in hand locate and name the parts of each horse. Note the points that make the draft type different from the road type.

**Conclusion:** Name the points of the draft horse that are different from those of the road horse, giving reasons for their being different.

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## EXERCISE No. 28

### USE OF A SCORE CARD

**Object:** To learn the comparative values of the different parts of a horse and to compare two different specimens.

**Material:** Two horses of the draft breed previously studied in class work. Score cards.

**Method:** Score the better individual and write up a comparison of the two horses. Go over the two carefully, pointing out the differences and correcting scores.

# SCORE CARD FOR A DRAFT HORSE

SCALE OF POINTS FOR DRAFT HORSE	PERFECT SCORE	Student's Score	Corrected Score
<b>GENERAL APPEARANCE: 22 points.</b>			
Age.....			
Height.....			
Weight; 1750 lb. or more, subtracting one point from total score for every 25 lb. under weight.....			
Form; broad, massive, low set, proportioned, ribs long and well sprung; flank low.....	6		
Quality; bone clean; tendons distinct; skin and hair fine.....	6		
Temperament; energetic, good disposition.....	4		
Set of Legs; legs straight and set squarely under the body.....	6		
<b>HEAD AND NECK: 10 points.</b>			
Head and Ears; head lean and medium size; ears medium size, alert, well carried.....	4		
Eyes; full, bright, clear, large.....	4		
Neck; muscled, crest high, throat-latch clean, windpipe large.....	2		
<b>FOREQUARTERS: 22 points.</b>			
Shoulders; sloping, smooth, extending into back, withers fine.....	4		
Arm and Forearm; well muscled, arm short, forearm long and wide.....	2		
Knees; wide clean cut, straight, deep, strongly supported.....	2		
Cannons; short, wide, tendons large and well set back.....	2		
Pasterns and Feet; pasterns sloping, lengthy, strong; feet large, even size, straight, dark colored, sole concave, frog large, elastic, heel wide. (Watch for side bones).....	12		

# **SCORE CARD FOR A DRAFT HORSE—Continued**

SCALE OF POINTS FOR DRAFT HORSE	PERFECT SCORE	Student's Score	Corrected Score
<b>BODY: 8 points.</b>			
Chest; deep, wide, large girth.....	4	.....	.....
Back; short, broad, heavily muscled.....	2	.....	.....
Loin; wide, short, thick.....	2	.....	.....
<b>HINDQUARTERS: 30 points.</b>			
Hips; smooth, wide.....	2	.....	.....
Croup; long, wide, muscular, tail attached high.....	2	.....	.....
Thighs and Quarters; heavily muscled, quarters deep, thick.....	6	.....	.....
No spavins.....	12	.....	.....
Cannons; short, wide, with tendons set far back.....	2	.....	.....
Pasterns and Feet; pasterns sloping, strong, lengthy; feet large, even size, straight, dark color, sole con- cave; bars strong; frog large, elastic; heel wide.....	6	.....	.....
<b>ACTION:</b>			
Walk; smooth, quick, long, balanced; . trot rapid, straight, regular.....	8	.....	.....
<b>TOTAL.....</b>	<b>100</b>	.....	.....

## EXERCISE No. 29

### FEEDING

**Object:** To become acquainted with the commercial feeds which it is proper to combine with native food stuffs, and to learn how to work out a suitable ration for a horse.

**Material:** Samples of different feeds, both commercial and native, in bottles, and as many in bulk as can be secured. (Have these samples in small pans.)

**Method:** Examine the feeds. Discuss these feeds as to their use in horse feeding, using a good table showing the per cent of digestible nutriment in each. Work out a ration for a 1000-pound horse at work. Show how to determine the amount of each feed to use from the nutritive ratio. Work out a ration for a 1600-pound horse doing medium work.

**Conclusion:** Explain an economical ration for a 1000-pound horse.

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Explain an economical ration for a 1600-pound horse.

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## EXERCISE No. 30

## A STUDY OF A DAIRY BARN

**Object:** To study a dairy barn and the method of handling milk.

**Material:** A dairy barn.

**Method:** A trip should be taken to one of the dairy barns in the community. A careful study should be made of the arrangement of the barn, sanitary conditions inside and around the barn, also the method of handling and caring for the milk.

**Conclusion:** Make a brief statement of the arrangement and sanitary conditions of the barn, and some suggestions for improvements.

[illegible]



## EXERCISE No. 31

### SCORING A DAIRY COW

**Object:** To become familiar with the conformation of the dairy cow.

**Method:** After the different terms have been explained score the cow according to the following score card:

#### SCORE CARD FOR DAIRY COW

Breed.....	Name of Cow.....
Estimated Age.....	Date of Birth.....
Estimated Weight.....	Corrected Weight.....

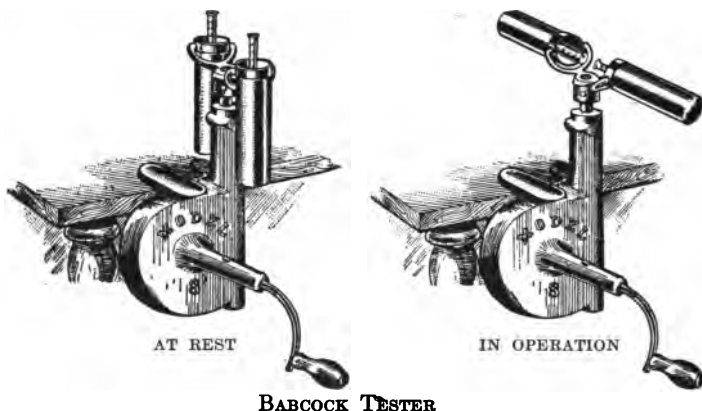
SCALE OF POINTS	Perfect Score	Student's Score	Corrected Score
<b>GENERAL APPEARANCE: 18 points.</b>			
Size; medium to large, according to breed.....	2		
Form; symmetrical, spare throughout, wedge shaped.....	4		
Health; apparently vigorous and thrifty	4		
Quality; hair fine, soft, skin mellow, loose, medium thickness, veins prominent on udder and face; secretions yellow and abundant; bone clean, fine.....	4		
Temperament; mild disposition, much nerve energy, inclined to convert food into milk, lean appearance when in milk.....	4		
<b>HEAD: 7 points.</b>			
Muzzle; moist, clean cut; mouth large; lips strong, nostrils large, open.....	1		
Eyes; large, protruding, bright, mild...	3		
Face; lean, medium length, showing facial veins.....	1		
Forehead; broad, dishing.....	1		
Ears; size medium; texture fine; secretions abundant.....	1		







After adding the acid to the milk, the bottles should be placed in the machine and whirled. Care should be taken to have the machine well balanced, that is, for every bottle on one side of the machine there should be a corresponding bottle on the opposite side. The bottles are whirled for five minutes and then filled with hot water up to the base of the neck. Whirling is then continued for two minutes more and hot water is added to bring the fat into the graduated neck to about 9% so that it can be easily read. The whirling is then continued for one minute.



The bottles are ready to read, and in case of whole milk one should read between the extreme points of the fat column. The bottles should be read at the temperature of 120° F.

The skimmed milk is tested in the same way as the whole milk, except that the skim milk bottle is used instead of the whole milk bottle. If time permits, cream may be tested for butter fat. It is weighed instead of measured.

Nine grams are usually used instead of 18. The correction is made in the reading.

**Conclusion:** The whole milk tested.....%. The skim milk tested.....%. The cream tested.....%.

### EXERCISE No. 33

#### PHYSICAL PROPERTIES OF MILK

**Object:** To become familiar with the physical properties of milk.

**Material:** Samples of whole milk, cream, skim milk, a compound microscope, beakers, a lactometer, and olive oil.

**Method:** 1. Examine a sample each of cream, whole milk, and skim milk under a compound microscope.

(a) Make a detailed drawing of a section of the field.  
(1) cream; (2) whole milk; (3) skim milk.

(b) What is the nature of the distribution of the globular bodies in each field? Can you infer what has caused the changes?

2. Add a few drops of olive oil to a test tube half full of water. After vigorously shaking the test tube, hold it in the light and observe the change that takes place.

(a) What is the proof that oil is lighter than water? Why does cream rise to the surface of the milk when left in a quiet place?

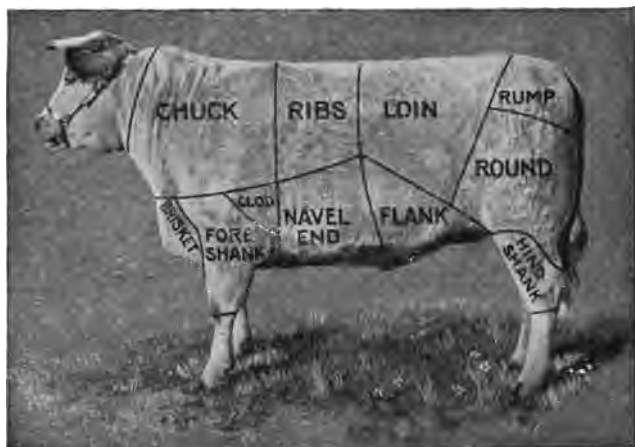
3. By the use of a lactometer determine the comparative weights of water, skim milk and whole milk. Does the heavy or light liquid exert the greater upward pressure (buoyant force) on the lactometer when submerged in it?

[illegible]

## COMPARATIVE COSTS OF DIFFERENT CUTS OF BEEF

**Material:** An outline drawing of a beef animal, an outline of the dressed carcass, a table of the prices of each part, compared with the whole beef animal.

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LOCATION OF CUTS OF BEEF

2. Make an outline drawing of the beef carcass. Label the parts in the drawing. Number them according to their importance from the butcher's standpoint.

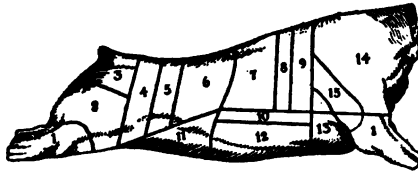


DIAGRAM OF BEEF CARCASS

**Cuts of Beef:**

**Hindquarters:** Round, loin, flank.

**Forequarters:** Rib, chuck, plate, and fore shank.

**Conclusion:** What parts should be developed most?

Why?

**COST OF LEAN AND OF TOTAL MEAT IN VARIOUS RETAIL CUTS  
AT ABOUT RETAIL MARKET PRICES**

RETAIL CUTS	Retail price per pound of cut. Lean, fat and bone combined.	Cost per lb. of only the lean and fat meat combined in cut.
<b>STEAKS:</b>		
Porterhouse, hip bone.....	\$0.25	\$0.29
Porterhouse, regular.....	.25	.27
Club steak.....	.20	.23
Sirloin, butt-end.....	.20	.21
Sirloin, round-bone.....	.20	.21
Sirloin, double-bone.....	.20	.23
Sirloin, hip-bone.....	.20	.24
Flank steak.....	.16	.16
Round, first cut.....	.15	.15
Round, middle cut.....	.15	.16
Round, last cut.....	.15	.16
Chuck, first cut.....	.12	.14
Chuck, last cut.....	.12	.13
<b>ROASTS:</b>		
Prime ribs, first cut.....	.26	.23
Prime ribs, last cut.....	.16	.19
Chuck, fifth rib.....	.15	.17
Rump.....	.12	.13
<b>BOILING AND STEWING PIECES:</b>		
Round pot roast.....	.10	.10
Shoulder clod.....	.10	.10
Shoulder pot roast.....	.10	.12
Rib ends.....	.08	.09
Brisket.....	.08	.09
Navel.....	.07	.08
Flank stew.....	.07	.07
Fore shank stew.....	.07	.07
Neck.....	.06	.07
<b>SOUP BONES:</b>		
Hind shank, middle.....	.05	.06
Hind shank, hock.....	.05	.26
Fore shank, middle cut.....	.05	.09
Fore shank, end.....	.05	.30



## EXERCISE No. 35

### SCORING BEEF CATTLE

**Object:** To learn the value of the different parts of the beef animal from the farmer's standpoint.

**Material:** A beef animal and a score card.

**Method:** Score the animal according to the score card.

#### SCORE CARD FOR BEEF CATTLE

SCALE OF POINTS FOR BEEF CATTLE	PERFECT SCORE	POINTS DEFICIENT	
		STUDENT'S SCORE	CORRECTED SCORE
<b>GENERAL APPEARANCE: 40 points.</b>			
Weight, according to age.....	10	.....	.....
Form; straight, top line and underline, deep, broad, low set, stylish.....	10	.....	.....
Quality; firm handling; hair fine; pli- ableskin; dense bone; evenly fleshed	10	.....	.....
Condition; deep, even covering of firm flesh, especially in region of valu- able cuts.....	10	.....	.....
<b>HEAD AND NECK: 7 points.</b>			
Muzzle broad; mouth large; jaws wide; nostrils large.....	1	.....	.....
Eyes; large, clear, placid.....	1	.....	.....
Face; short, quiet expression.....	1	.....	.....
Forehead; broad, full.....	1	.....	.....
Ears; medium size, fine texture.....	1	.....	.....
Horns; fine texture, oval, medium size	1	.....	.....
Neck; thick, short; throat clean.....	1	.....	.....
<b>FOREQUARTERS: 8 points.</b>			
Shoulder Vein; full.....	2	.....	.....
Shoulders; covered with flesh, compact on top; smooth.....	2	.....	.....
Brisket; advanced, breast wide.....	1	.....	.....
Dewlap; skin not too loose and drooping	1	.....	.....
Legs; straight, short; arm full; shank fine, smooth.....	2	.....	.....

### SCORE CARD FOR BEEF CATTLE (Continued)

SCALE OF POINTS FOR BEEF CATTLE	PERFECT SCORE	POINTS DEFICIENT	
		STUDENT'S SCORE	CORRECTED SCORE
<b>BODY: 32 points.</b>			
Chest; full, deep, wide; girth large; crops full.....	4	.....	.....
Ribs; long, arched, thickly fleshed.....	8	.....	.....
Back; broad, straight, even.....	10	.....	.....
Loin; thick, broad.....	8	.....	.....
Flank; full, even with underline.....	2	.....	.....
<b>HINDQUARTERS: 13 points.</b>			
Hips; smoothly covered; distance apart in proportion with other parts.....	2	.....	.....
Rump; long, wide, even; tail-head smooth; not patchy.....	2	.....	.....
Pin Bones; not prominent; far apart...	1	.....	.....
Thighs; full, deep, wide.....	4	.....	.....
Twist; deep, plump.....	2	.....	.....
Legs; straight, short; shank fine, smooth	2	.....	.....
<b>TOTAL.....</b>	<b>100</b>	.....	.....

Estimated Weights.....

Correct Weights.....

### EXERCISE No. 36

#### CUTS OF PORK

**Object:** To learn the value of the different cuts of pork.

**Material:** Outline of a dressed hog, and the prices of the different cuts from the butcher's standpoint.

**Method:** Make an outline of the dressed carcass. Write the name of each cut in its proper place. After discussing the value of each cut including weight and price, number the cuts on the outline according to their importance.

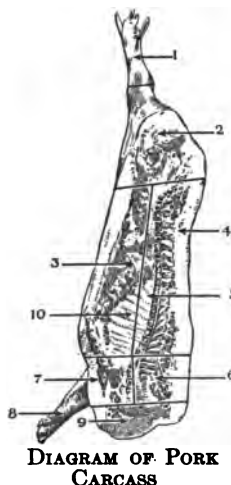


LOCATION OF CUTS OF PORK

**Conclusion:** Why is a long neck or long legs on hogs undesirable? What parts do the butchers want developed? Why? Which is the highest priced part of the hog? The lowest priced part?

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CUTS OF THE HOG AND PRICES

RETAIL CUTS	RETAIL PRICES
Neck .....	\$0.18
Feet .....	.10
Shoulder .....	.20
Ham .....	.23
Back:	
Chops .....	.27
Loin .....	.25
Fat bacon .....	.15
Side, bacon .....	.15



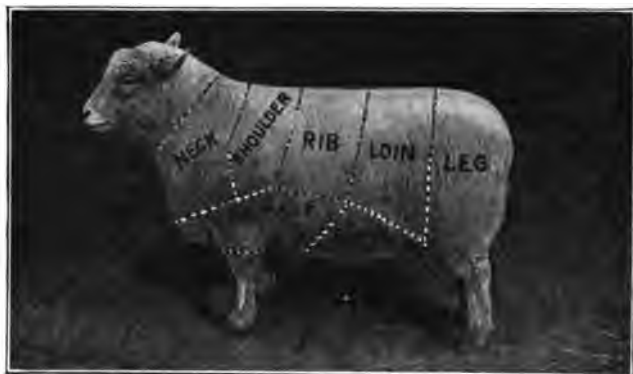
## EXERCISE No. 37

### CUTS OF MUTTON

**Object:** To learn the value of the different cuts of mutton.

**Material:** Outline of a dressed sheep and the prices of the different cuts from the butcher's standpoint.

**Method:** Make an outline of the dressed carcass. Write the name of each cut in its proper place. After discussing the relative value of each cut, number the cuts on the outline according to their importance.



**LOCATION OF CUTS OF MUTTON**

# CUTS OF THE SHEEP, AND PRICES

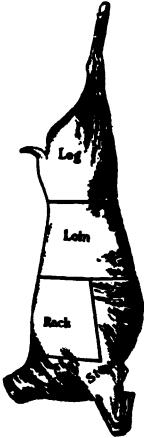


DIAGRAM OF  
MUTTON  
CARCASS

RETAIL CUTS	RETAIL PRICES
Neck.....	\$0.15
Shoulder.....	.18
Back.....	.25
Loin.....	.15
Leg, hind.....	.25
Flank.....	.10
Breast.....	.10
Leg, fore.....	.10

**Conclusion:** Why is a long neck or long legs on a sheep undesirable? What parts do the butchers want well developed? Why?

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## EXERCISE No. 38

### POULTRY HOUSE

**Object:** To become familiar with the poultry house.

**Material:** Bulletins containing drawings of poultry houses.

**Method:** After determining the size and arrangement of a poultry house, draw the plan to a scale. Draw both side and end elevations.

**Conclusion:** The points to be considered in the construction of a poultry house. Some strong points that can be brought out in the drawing.

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## EXERCISE No. 39

### TYPES AND BREEDS OF CHICKENS

**Object:** To learn to recognize some of the common breeds of chickens.

**Material:** Specimens of as many of the common breeds of chickens as can be secured.

**Method:** Place the specimens before the class so that they can be studied by comparison and contrast. Remember that form determines the breed and color determines the variety.

Use the following classification:

1. **Egg Breeds:** Very hardy; close feathered; excellent foragers; very active; nervous; white ear lobes; good layers; poor sitters; mature early; small; graceful curves, as the Leghorns of medium size; long, sloping backs and a six-pointed comb, as the Minorcas.

2. **General Purpose Breeds:** Medium size; hardy; good foragers; fair sitters; good mothers; red ear lobes; brown tinted eggs; good winter layers; mature in  $5\frac{1}{2}$  to  $6\frac{1}{2}$  months as:

(a) The American Class with yellow skin and shanks as, the Plymouth Rocks with single comb; high set, long backs, and deep body. The Wyandottes with rose comb, graceful curves, short, broad back, deep, round body, and very plump. The Rhode Island Reds with rich red combs, compactly built, and shoe-box shape.

(b) The English Class with white skin and shanks as, the Orpingtons which are large and stately; have long, round, deep bodies; full breasts; broad backs; solid color; and good layers.

**3. Meat Breeds:** Large; heavy; loose feathered; feathered shanks; quiet; brown eggs; clumsy; good sitters, as the Cochins with single combs; round bodies; very deep, broad and massive; slow maturing; coarse meat; middle and outer toe feathered; persistent sitters; and heavy fluff, as the Brahmas with pea combs; well proportioned; compact bodies; not excessive fluff; and very large.

**Conclusion:** How do you recognize each breed?

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## EXERCISE No. 40

### A GENERAL PURPOSE FOWL

**Object:** To learn the points of a good general purpose fowl.

**Material:** A good type of hen or rooster (both, if time permits) of some general purpose breed, a score card, and pictures of prize fowls.

**Method:** Compare the specimen point by point with the ideal fowl, estimate the value of each point and express this on the score card. This work may be done as a class or in groups, the teacher directing the outline.

**Conclusion:** Make out a score card for egg and meat breed to compare with this general purpose breed.



**EXERCISE No. 41**  
**POULTRY SCORE CARD**

<b>RHODE ISLAND RED</b>	<b>PERFECT SCORE</b>	<b>CORRECTED SCORE</b>
General Appearance.....	12½	.....
Form.....	5	.....
Compact and symmetrical, no unusual develop- ment on any part of body or fat behind the legs.		
Quality.....	4	.....
Comb fine, flesh soft but not fat, skin medium thick and mellow.		
Temperament.....	3½	.....
Active, vigorous, not lazy.		
Head and Neck.....	7½	.....
Size of head medium, broad.....	1	.....
Eyes bright and full.....	1½	.....
Comb and wattles medium size and bright red.....	3	.....
Neck of medium length, full.....	2	.....
Body.....	25	.....
Breast moderately full, but very wide.....	3	.....
Back wide and fairly long with great depth from back to keel.....	2½	.....
Hindquarters greatly developed with the heaviest part of the body carried back of the hock joint..	7½	.....
Fluff abundant, fine, and close to body.....	1½	.....
Lay bones soft and wide spread.....	8	.....
Tail set high and well spread.....	1	.....
Wings held well up and close to the body.....	1½	.....
Legs.....	5	.....
Well spread and set wide apart at the hock joint, free from feathers.....	3	.....
Length medium to short.....	1	.....
Color of shank, yellow or white.....	1	.....
<b>TOTAL.....</b>	<b>100</b>	.....

## EXERCISE No. 42

### THE FORMATION OF AN EGG

**Object:** To learn how the egg is formed.

**Material:** A laying hen.

**Method:** Dissect a hen in the class. Study the reproductive parts as they are located in the hen.

**Conclusion:** The ovary, ovules, and oviduct are the names of the reproductive organs. Parts of the oviduct are the funnel ( $\frac{4}{5}$  hr.); albumen secretion parts, isthmus ( $\frac{3}{4}$  hr.); shell gland (14 to 16 hr.). These numbers indicate the time each part takes in the formation of an egg. Make a drawing of the reproductive parts and properly label each part of it.

## EXERCISE No. 43

### THE PARTS OF AN EGG

**Object:** To learn to name the parts of an egg and to tell a fertile from an infertile egg.

**Material:** Saucers, fertile and infertile eggs.

**Method:** Break each egg into a saucer, study the parts and locate them; as shell, outer and inner membrane, white, yolk, spirals or chalaza, air space, and germ.

**Conclusion:** The parts of the egg properly located and labeled. The fertile egg has a band around the germ, while the infertile egg has only a spotted germ in it.

#### EXERCISE No. 44

##### THE EFFECT OF FEED ON THE COLOR OF EGGS

**Object:** To learn the effect of feed on the color of eggs.

**Material:** Eggs produced by hens fed on green feed and eggs produced by hens deprived of green feed.

**Method:** Break eggs of each kind in saucers and compare those of hens fed green feed with those deprived of green feed.

**Conclusion:** Does the color of eggs depend upon the feed?.....

How do you account for this?.....

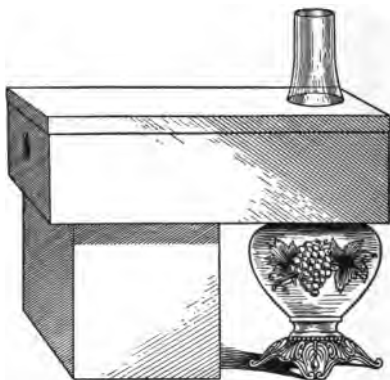
## EXERCISE No. 45

### CANDLING EGGS

**Object:** To be able to tell the freshness of eggs without breaking them.

**Material:** Some fertile eggs, some infertile eggs known to be bad, some fertile eggs known to have been under a hen from 24 to 60 hours, a dark room, a lamp, and a shoe box.

**Method:** Cut a hole in the box large enough to fit around the lamp chimney as shown in the illustration. Cut a hole about the size of a half dollar in the end of the box opposite to the light. Hold the egg in front of the hole in the box, and turn it from side to side. Note the appearance of the yolk. The air space in a fresh egg is about the



HOME-MADE CANDLING OUTFIT

size of a dime; if dry, it may be the size of a quarter. The egg should be clear except a shadow across the yolk. If the egg contains a spot or sticks to one side, break and examine it.

As an egg becomes older, the white loses its firm, thick, viscous condition and becomes thinner, and more watery. The thinner white allows the yolk to pass more rapidly and the yolk appears through the thinner white to be darker in color. The air space, separated by the shell membrane,

becomes larger as the egg becomes older, so the freshness of the egg is told by the yolk and the air space. The fertile egg will show the developing germ, while no germ can be seen in the infertile egg. (For illustrations see Iowa Extension Bulletin No. 25.)

**Conclusion:** How many of the eggs examined were fresh? What was the condition of the other eggs? Explain the use of the germ in the fertile egg.....

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## EXERCISE No. 46

### EFFECT OF TEMPERATURE ON EGGS

**Object:** To learn the effect of keeping eggs at different temperatures.

**Material:** Eggs that have been kept at temperatures of 35 and 70 degrees, and fresh eggs.

**Method:** Candle, break, and examine.

**Conclusion:** State the condition of eggs kept at each temperature as compared with fresh eggs.....

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## EXERCISE No. 47

### SCORING EGGS

#### SCORE CARD FOR EGGS

Disqualifications: Double yolk, cracked and extremely dirty shells, extremely shrunken, spotted or loose contents in any one egg of the dozen.

SCALE OF POINTS	PERFECT SCORE	STUDENT'S SCORE	CORRECTED SCORE
1. Weight..... 24 to 28 oz. per doz. Cut two points for each oz. over or under weight.	20		
2. Uniformity of size..... All eggs should be of the same size.	10		
3. Shape..... Should be typical egg shape, free from ridges, uniformly the same for the entire dozen.	10		
4. Strength and smoothness of shell..... Shell should be free from wrinkles, cracks, and rough places.	10		
5. Condition of shell..... Free from dirt or stain and free from gloss, showing that the egg is fresh and unwashed.	10		
6. Uniformity of color..... If white, the eggs should be all pure white and of same shade; if brown the color may be any shade, but uniformly the same for the doz.	10		
7. Quality:			
(a) Fullness (Small air cell).....	15		
(b) Clearness.....	15		
Test with candler. A very small air cell not larger than a dime indi- cates freshness. The egg must appear clear, free from dark colored spots, the white thick, the yolk barely visible. Large air cells or floating yolk are disqualifications.			
TOTAL.....	100		

## EXERCISE No. 48

### CARING FOR AND MARKETING EGGS

**Object:** To learn how to care for eggs and to market them.

**Material:** An egg tester and eggs that have been stored for several weeks (a) in a living room of a house and (b) in a cool cellar; fresh eggs and eggs which have been incubated for different periods; three lots of eggs of a dozen each, one carefully sorted for color and size, one of various colors, and one of uniform color, but of various shapes and sizes.

**Method:** 1. **The Effect of Storage.** Candle several fresh eggs. Candle others which have been incubated for one, three, and seven days respectively, and several from each of the two sets of stored eggs. Make careful comparisons.

2. **Preparation for Market.** Compare the three sets of market eggs. Rank them in the order in which you think they would sell, giving your reasons. Visit a grocery store and note whether the eggs there have been sorted to uniform shapes, sizes, and colors.

**Conclusion:** What difference did you find between fresh and stored eggs? Would you store eggs in a living room of your home or in a cool cellar? Give reasons.

What changes did you find in eggs due to incubation? Does this help to explain any of the conditions that you found in stored eggs?

State briefly how you would prepare eggs for market so as to make them most salable.....

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## EXERCISE No. 49

### PICTURE BOOK

**Object:** To make a picture book of animals that will show the chief characteristic of the different types and breeds and a comparison of them.

**Material:** An ordinary scrap book, scissors, paste, and papers with good pictures of the different types and breeds of horses, cattle, sheep, hogs, and chickens.

**Method:** Paste in the book several good pictures of the Percheron followed by the Clydesdale, Shire, etc., until there is a complete list of all the different types and breeds. At the end of this group paste in one picture of each breed or type to show a comparison. Follow this with good pictures of cattle, sheep, hogs, and chickens arranged in the same manner as those of the horse. At the end of each lot of pictures paste in one of each type and breed to show a comparison.

**Conclusion:** The book completed.

## EXERCISE No. 50

### COMPOSITION OF SOIL

**Object:** To learn the composition of different kinds of soil.

**Material:** A compound microscope, samples of clay, silt, loam, muck, and sand.

**Method:** Observe each of the different kinds of soil under the microscope and note its composition as to (a) size, (b) kind of material, (c) most common form of particles, and (d) color.

**Conclusion:** Make drawings of the comparative sizes of the different soils examined.....  
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## EXERCISE No. 51

### TESTING SOILS

**Object:** To see if the soils in the community need lime.

**Material:** Soil auger, red and blue litmus paper, muriatic acid, and fields in the community.

**Method:** Make the first test on the school lot. Take the top soil, and the soil six inches, one foot, two feet, and four feet deep. The test is made by taking some of the soil from each depth. A handful is enough for the test, which

should be made when the soil is damp or it will need to be dampened. Place the litmus paper in the middle of the soil and squeeze it tightly. Leave it for five minutes. Red litmus paper will turn blue if the soil is alkali. Blue litmus paper will turn red, if the soil is sour. If the soil contains enough lime (is not sour) the acid will foam with little white bubbles. Make the test in as many places as time will permit. They should be made in fields that are to be farmed the coming year so as to see the effect of any treatment that is given them.

**Conclusion:** What was the condition of the soil where the different tests were made?.....

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## EXERCISE No. 52

### SIZE OF SOIL PARTICLES

**Object:** To show that soils are composed of particles of various sizes.

**Material:** Samples of as many different kinds of soil as can be found.

**Method:** Place a handful each of clay, peat, and muck in a jar one-third filled with water, and shake well. Pour off the water in a few minutes. Slowly evaporate the residue to dryness, meanwhile allowing the muddy water to

**Conclusion:** Why should the first dried residue be of coarser particles than the second, and the second coarser than the material remaining suspended in the muddy water? Why should soils differ in type, in color, and in size of particles? Why do clays wet readily and sands wet much more slowly? Why do differences occur in temperatures of different soils? Why does grass grow better on clay loams than on sandy loams, and corn better in a sandy region than on clay?.....

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## EXERCISE No. 53

### PERCOLATION OF WATER

**Object:** To show the percolation, or downward pressure, of water.

**Material:** Lamp chimneys, soils, and cheese cloth.

**Method:** Fill a lamp chimney (closed at the bottom with a piece of cheese cloth tied tightly over it) with some of the soils to be tested. Fill another lamp chimney with another kind of soil. Pour water upon the top of each column of soil and note the percolation of the water through it.

**Conclusion:** Does the water stay in the tubes? In which one does it pass through more quickly? In which one least quickly? Compare various kinds of soil in this respect. Measure the amount of water percolated through each chimney in half an hour.

What can you say about the power of sand to hold rain which falls upon it? Its power to take up moisture from below? Why is it well to run a roller over a sandy soil? Why is water more likely to run off the surface of a clay soil than of a sandy soil? What may be done to the sand to make it hold water better?.....

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## EXERCISE No. 54

### WATER ENTERING A TILE DRAIN

**Object:** To determine how and where water enters the tile drain.

**Material:** A quart tin can, a quantity of fine sand or of sandy loam soil.

**Method:** Punch three nail holes in the can, one about three-fourths of an inch from the bottom, the second about the same distance above the first but a little to the right of it; the third hole about three-fourths of an inch above the second and a little to the right of it. Fill the can with soil to within half an inch of the top. Pour water on the soil and notice from which hole the water comes first.

**Conclusion:** From which hole did the water begin to flow first? If the lowest hole then represents the bottom of the tile, the second one the middle of the tile, and the third the top of the tile, where does the water naturally enter the tile? Can you tell why the water enters the joints at the bottom?

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## EXERCISE No. 55

### SUN'S HEAT ON DRY AND WET SOILS

**Object:** To note the effect the sun has on the temperature of a dry soil and a wet soil.

**Material:** Two chalk boxes, dry sand, water, two thermometers, and scales.

**Method:** Weigh one of the boxes empty. Fill this box with dry sand, and weigh the box and sand together. Determine the weight of the sand. Add water to the amount of about 15% of the weight of the sand. Fill the second box with sand. Place each box in the sunlight. Put a thermometer two inches deep into each box. Take the temperature at the start, at the end of ten minutes, and in twenty minutes later.

#### Results:

Condition.....	Box 1	Box 2
Temperature when started.....		
Temperature at end of 10 minutes.....		
Temperature at end of 20 minutes.....		
Difference between start and 10 minutes.....		
Difference between 10 and 20 minutes.....		

**Conclusion:** Which box was the warmer?

Would you consider early evening or early morning the better time for watering plants? Why?.....

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## EXERCISE No. 56

### RISE OF WATER IN SOIL

**Object:** To study the rise of water in soils of different types.

**Material:** Three tall lamp chimneys; pieces of cheese cloth to cover the bottoms of the lamp chimneys; a shallow pan; water; gravel, sandy loam and clay loam soils, both air dried, and a sieve.

**Method:** Tie a piece of cheese cloth over the bottom of each lamp chimney. Fill each lamp chimney with one of the soils, jarring it so as to settle the soil, making it of uniform density. Stand the chimneys full of soil in the pan of water. Watch the water rise in the chimneys. If it is necessary to use two or more pans, keep the water in them at uniform height.

**Conclusion:** In which chimney does the water rise immediately? In which pan is there apparently a very little rise of water? In which tube does the water reach the top first? Does the water in all the chimneys finally reach the top? What kind of soil carries water up to plants most rapidly if the distance is not too great? What type of soil is best for crops needing a large amount of water, if the water supply or the water table or standing water is not too far below the surface? In what kind of soil will water rise to the greatest height?

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## EXERCISE No. 57

### RATE OF PERCOLATION

**Object:** To show the rate of percolation of water through fine textured and coarse textured soils.

**Material:** A very fine sand, a coarse sand, two funnels or percolators.

**Method:** Place the samples of each of the sands in the different percolators, filling them to a height of about six inches. Invert over each funnel a bottle full of water, arranging the bottles so that an equal head of water will be maintained above the top of the sand in each percolator. As soon as the water is running steadily in each through the sands, place beakers under each percolator and note the time this is done. At the end of a given time, remove the beakers and measure each by the quantity of water that is run through a 100 cc. graduate. Calculate the rate of flow of water in cubic centimeters per second.

**Conclusion:** What is the influence of the size of the soil grains on the amount of percolating water? Is leaching a more important problem on coarse grained or on fine grained soil?.....

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## EXERCISE No. 58

### PLOWING-UNDER ORGANIC MATTER

**Object:** To illustrate the effect of plowing-under organic matter.

**Material:** Two lamp chimneys, a quantity of dry fine soil, some finely cut straw or chaff, some well rotted straw, and some manure.

**Method:** Tie a cloth over the bottom of each chimney. Fill each chimney three-fourths full of soil. In one put an inch of cut straw, pushing it compactly together. In the other put an inch of the rotted straw likewise pushed together. To each add enough fine soil to fill the chimney. Set each chimney in a pan in a half inch of water. Allow them to stand for a few days.

**Conclusion:** Note the rise of the water. Does it pass through the straw as quickly as it does through the rotted material? Why? The straw and rotted material represent material plowed under and lying in the bottom of the furrow. The soil on top represents the furrow slice. In which condition do you think a crop would suffer least from dry weather? When should strawy manures be plowed under? When should new ground be broken up? Should spring or fall be chosen for these purposes? Why?

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## EXERCISE No. 59

## FREEZING AND THAWING

**Object:** To show the effect of freezing and thawing upon soil structure.

**Material:** Clay soil and a mixing board.

**Method:** Take a big handful of clay, wet it, mix it well, and mould it into a ball with the hands. Prepare a second ball of clay in the same manner, adding the same quantity of water to an equal weight of clay. Expose the second ball of clay to alternate freezing and thawing about ten times. Keep the first ball in a frozen condition. At the end of a week allow both balls to thaw out.

**Conclusion:** Compare their structures. What has happened? Tell the reason.....

[illegible]

## EXERCISE No. 60

### SOIL DRAINAGE

**Object:** To show the effect of drainage on soil.

**Material:** Two empty flower pots, paraffin, and two healthy growing flowers.

**Method:** Number the flower pots 1 and 2. Plug up hole in each with melted paraffin so that no air can pass through. In the bottom of No. 2 put about one inch of pebbles or coarse sand. Fill each pot nearly full with a mixture of good soil and sand, three parts of soil to one part of sand. Place one of the healthy flowers in each pot. The flowers should be of the same size. The soil should be packed around them so that they will grow. Water the flowers until the soil is saturated; then place the pots in a sunny window. Place a thermometer in each pot with the bulb about two inches below the surface of the soil. Make note of the temperature every day for two weeks or until the plants start to grow.

**Conclusion:** When the above conditions exist in the soil of fields, in which field will the water penetrate more easily? In which field will the temperature be higher? After these records have been taken, the plants should be watered and left growing for a month. At the end of this time which has developed the better root system? In which pot do the roots go the deeper? Why? What is the effect of drainage on plant growth?.....

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## EXERCISE No. 61

### OXYGEN AND GERMINATION

**Object:** To learn whether oxygen is necessary for germination.

**Material:** Beans or peas, two one-pint Mason jars, and saw dust.

**Method:** Soak the seeds 12 to 24 hours. Place a layer of saw-dust an inch deep in each jar and cover with a piece of blotting paper. In one jar place a few seeds and cover loosely. Fill the other jar full and cover tightly so that there will then be but little air for each seed. Set both jars in a warm place for several days.

**Conclusion:** Explain the difference in the growth of the two lots of seed. Under what field conditions would seeds get too little air?.....

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## EXERCISE No. 62

### EFFECT OF LIGHT UPON GERMINATION AND PLANT GROWTH

**Object:** To learn the effect of light upon germination and growth of plants.

**Material:** Soaked grains of corn, germinated grains of corn with shoots two inches long, four flower pots, and soil.

**Method:** Plant the corn that has been soaked over two nights in two of the pots and transplant one or more seed-

lings in each of the other two pots. Set all in a warm place near together. Cover pots containing one of each kind of corn with large tin cans so as to exclude the light but not the air. Leave for a week. Do not allow them to become very dry.

**Conclusion:** Is light necessary for germination? Is it necessary for healthy plant growth?.....

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### EXERCISE No. 63

#### AMOUNT OF AIR NEEDED BY ROOTS

**Object:** To learn whether roots need air.

**Material:** Two bottles or glasses and some cuttings of willow or Wandering Jew.

**Method:** Place two or three cuttings in each bottle, fill each one two-thirds full of water and over the surface of one pour a thin layer of sweet or castor oil to exclude the air. Leave them in a warm, sunny place for a week or more.

**Conclusion:** Can roots grow without air?.....

N. B. An excess of water in the soil largely excludes the air. Could you drown a tree or a corn plant?.....



## EXERCISE No. 64

### MOISTURE REQUIRED FOR GERMINATION

**Object:** To learn how much moisture seeds require for germination.

**Material:** Wheat, corn, beans, and sunflower seeds; tumblers or jelly glasses with covers, sand, and saw-dust.

**Method:** Take four glasses. Fill each one-third full of sand or saw-dust. Leave one dry and make the others respectively, moist, very moist, and saturated. Plant three seeds of each of the different kinds in each glass. Set all in a dry place and cover to prevent drying.

**Conclusion:** With what degree of moisture do these particular seeds germinate best?.....

## EXERCISE No. 65

### EFFECT OF TEMPERATURE ON GERMINATION

**Object:** To learn the temperature at which seeds germinate best.

**Material:** Corn, oats, peas, and squash seeds; glasses and saw-dust.

**Method:** Plant several seeds of each kind in moist saw-dust in each of the several glasses. Set one in a very warm place, one in an ice box, and the others in places with intermediate temperatures. Have other conditions so far as possible the same. Examine each every other day for a week.

**Conclusion:** What temperatures do you find best for germination?.....

Do seeds vary in this respect?.....

## EXERCISE No. 66

### DEPTH FOR PLANTING SEEDS

**Object:** To determine the best depth for planting various seeds.

**Material:** Box of soil, olive bottle eight inches high or Mason jar, so that plants may be observed. Twenty seeds each of beans, peas, clover, oats, etc.

**Method:\*** Plant a few seeds of each kind at depths of  $\frac{1}{2}$ , 1, 2, 3, 4, 5, and 6 inches. Fill the jar with soil to within six inches of the top and plant a few seeds. Put in another inch of soil and plant more seeds. Continue this method of planting until the jar is full, arranging the seeds in different sized circles. Wrap a black cloth around the jar to exclude the light. Record the date at which each comes up, and tabulate results from the whole class record.

DEPTH PLANTED	BEANS	PEAS	CLOVER	OATS	CORN	WHEAT	RADISH
$\frac{1}{2}$ inch. ....							
1 inch. ....							
2 inches, etc. ....							

**Conclusion:** Which should be planted deeper, peas or beans? Why this difference? In what way does temperature, character of soil, and amount of moisture influence depth of planting? What is the purpose of rolling or "planking?" Is it more desirable with large or small seeds? In a wet or dry season? .....

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\*With a large class divide the work and give each division different kinds of seeds.

## ROOT GROWTH

**Conclusion:** Which soil contained the greater number of roots? Compare the size and length of the roots in the sand with those in the soil. Compare the number of root hairs on the roots in the sand with those in the soil. What caused this difference? What effect has good soil on the root system?

[illegible]

## EXERCISE No. 68

### AMOUNT OF WATER USED FOR PLANT GROWTH

**Object:** To learn whether or not plants can use all the moisture in the soil.

**Material:** Four flower pots, enough of each of the four kinds of soil to fill a pot, and four cuttings of geraniums (corn may be used).

**Method:** After the plants have grown to a height of three inches, water thoroughly. Allow the pots to stand without watering until the plants are badly withered. When it is evident that they can no longer absorb moisture from the soil, weigh the soil. Then thoroughly dry it by heating it in a pan, weigh it again, and ascertain the difference in weight. This difference is the amount of water in the soil that the plants cannot use.

**Conclusion:** What per cent of water remained in each soil that the plant was not able to use?.....Which soil would you prefer in a dry season?.....Which soil would you prefer in a wet season?.....What can be learned from this exercise about the usable amount of water in the different soils?.....

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## **EXERCISE No. 69**

### **FARM DRAINAGE**

**Object:** To locate the drainage lines needed on a farm.

**Material:** Plat of farm, paper, and rule.

**Method:** Make a drawing of the lateral tile drainage needed on a 160-acre farm. Use red ink except for the heavy main lines, which should be black.

**Conclusion:** Location of the tile drains and the number of rods of tile on the entire farm.

## EXERCISE No. 70

### MAKING CONCRETE

**Object:** To learn how to make concrete.

**Material:** Sand, gravel, cement, sieve, shovel, and bucket.

**Method:** Make some concrete from one of the formulas in the book. The proportion of each material will depend upon where the concrete is to be used. The formula used should be the one that is used in the community where the pupils can also see the men making it.

Concrete is a mixture of cement and sand, or of cement, sand, and gravel or crushed stone. It is used for building sidewalks, silos, reservoirs, dams, and a variety of other things.

Sand and stone are bought by the cubic yard or load, and cement by the sack or barrel.

A sack of cement is  $\frac{1}{4}$  of a barrel and a barrel is estimated to contain 4 cu. ft. and to weigh 376 lb.

The materials which make up concrete are mixed in varying proportions, depending upon the purpose for which the concrete is to be used. A very common mixture is 1, 2, 4. This means that for making a cubic yard of concrete a certain amount of cement is used, 2 times as much sand (by volume), and 4 times as much stone.

The table (ninth line) shows the number of barrels of cement required for one cubic yard of concrete mixed in the proportion 1, 2, 4. The amounts of sand and stone required, expressed as parts of a cubic yard, may be figured as follows:

$$1.51 \text{ bbl. cement} = 1.51 \times 4 \text{ cu. ft.} = 6.04 \text{ (cu. ft.)}.$$

$$6.04 \text{ cu. ft.} = \frac{6.04}{27} \text{ or } .2237 \text{ cu. yd.}$$

$$2 \times .2237 \text{ cu. yd.} = .4474, \text{ or approximately } .45 \text{ cu. yd. of sand.}$$

$$4 \times .2237 \text{ cu. yd.} = .8948, \text{ or approximately } .89 \text{ cu. yd. of stone.}$$



## FARM MACHINERY

**Material:** An implement store.

**Conclusion:** The things learned about the machinery as to the best kind to use in connection with wheat or alfalfa crop.....

[illegible]



## EXERCISE No. 72

### DRAWING PLANS OF FARM BUILDINGS

**Object:** To learn to plan a house and a barn.

**Material:** Drawing paper, ruler, house, and barn plans.

**Method:** Study a book of plans and the plans of several buildings in the community before starting to draw a plan.

**Conclusion:** Draw plans for an ideal barn. Draw plans for an up-to-date country home. Draw each plan to an accurate scale.



## EXERCISE No. 73

### ROPE KNOTS

**Object:** To learn to tie knots and to splice a rope.

**Material:** 12 feet of rope and Iowa Extension Bulletin No. 24 Ames, Iowa, or Iowa Farmer's Bulletin No.638 or Cornell Reading Courses on Knots, Hitches and Splices, Cornell University.

**Method:** Try to tie each knot and make a splice as shown in the Bulletin.

**Conclusion:** Name the knots tied and the splices made.

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## EXERCISE No. 74

### LAYING OUT AN ORCHARD

**Object:** To learn how to lay out an orchard.

**Material:** Three dozen stakes a foot and a half long, one dozen 3 feet long, all sharpened at one end, a hammer, plenty of string, three rings and a tape line.

**Method:** See Bailey's "Principles of Fruit-Growing," page 262.

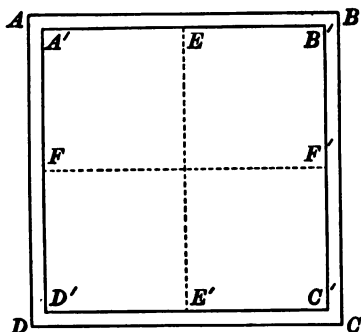


FIG. 1

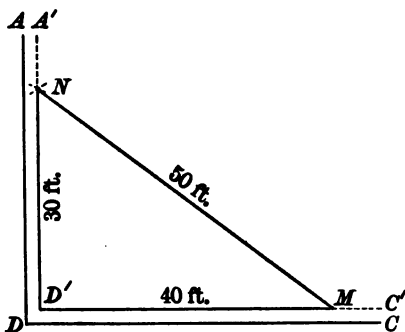


FIG. 2

### A. SQUARE METHOD

Let  $ABCD$  represent a square acre bounded by field lines or fences. The problem is to stake this field preparatory to planting an orchard, on the square system, the trees to be thirty feet apart and the outer trees to be fourteen feet from the fence lines.

The larger stakes are guide stakes. These are to be used only as guides in sighting to test the position of the smaller stakes which are used to show the locations of the trees. The guide stakes are to be placed along the fence lines, fourteen feet apart and just far enough from the fences so that one can walk between them and the fences.

Place one guide stake near line  $AD$ , just 14 feet from point  $D$ . Place another near line  $BC$ , just 14 feet from point  $C$ .

Place your first tree stake at point  $D'$  (See Fig. 1), which is just 14 feet from line  $DC$  and 14 feet from line  $AD$ . Find this point by measurement. Test its position by sighting between the two guide stakes. Set a tree stake at  $C'$ , following the same plan.

Now make a right angle at point  $D'$  as follows. Measure 40 feet along line  $D'C'$ , and fix point  $M$  (See Fig. 2). From  $D'$ , using a tape line, swing a 30-foot arc, and from point  $M$  swing a 50-foot arc, the two arcs intersecting

at  $N$ . The triangle  $D'MN$  (See Fig. 2) is a right angle. Fix point  $A'$  (Fig. 1) by continuing line  $D'N$  to a point 14 feet from fence line  $AB$ . Place a guide stake behind point  $A'$ , along fence line  $AB$ .

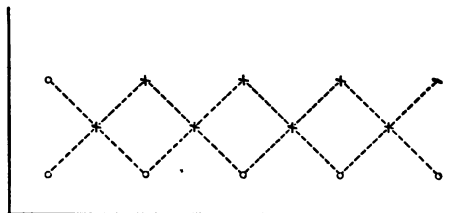
In the same manner, make a right angle at point  $A'$  and fix line  $A'B'$ . Then make a right angle at  $C'$  and fix point  $B'$ .

Next place guide stakes at  $E, E', F$ , and  $F'$  (Fig. 1). Their exact position on the line is immaterial so long as they are exactly on the line. Guide stakes are used only in sighting.

Finally, set all the tree stakes, beginning at point  $D'$ . Since all corners of the square are fixed, the setting of the tree stakes is merely a matter of accurate measuring and sighting.

## B. HEXAGONAL METHOD

See Bailey's "Principles of Fruit-Growing," page 265.



The problem is to lay off a square acre according to the hexagonal system with the trees 30 feet apart each way. First fix the base line, following the plan used in Exercise A, and set the stake for the first tree, 14 feet from the fence line, on this base line. Tie a ring on each end of a 30-foot string or wire and measuring with this apparatus set tree stakes along the base line at intervals of 30 feet.

Next, using the 30-foot string, swing arcs from the tree stakes set on the base line. At the points of intersection of these arcs, as shown by the diagram, set stakes for the second row of trees. Then complete the lay-out of the other rows in the same manner.

Make drawings showing the exact number of trees to the acre by each method.

**Conclusion:** The number of the trees to the acre by the square system is..... The number of trees by the hexagonal system is..... There are.....% more trees by the .....method.

## GRAFTING WAX

**Material:** Beeswax, rosin, tallow, and a pan.

**Conclusion:** What precaution should we take in making grafting wax?.....

grating wax!.....

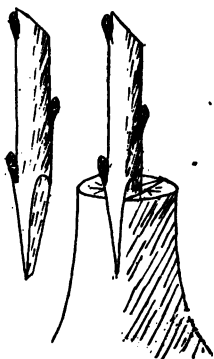
## EXERCISE No. 76

### BRIDGE GRAFTING

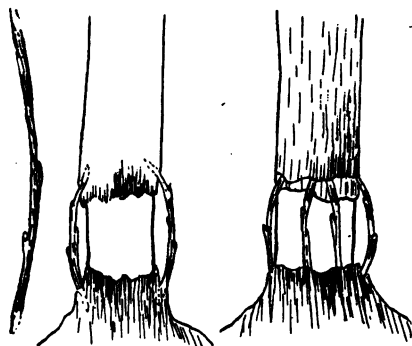
**Object:** To learn how to bridge over injured parts of trees.

**Material:** A small orchard tree which has been girdled, and scions.

**Method:** This grafting consists of bridging the injured parts by means of scions of the last season's growth to connect the part below the wound with the part above the wound. First trim the bark around the injured parts. Sharpen both ends of the scions and fasten them in the cambium layer above and below the wounded part. Cover well joinings with grafting wax and wrap with old cloth to keep the wax from drying out or from melting by the sun.



CLEFT GRAFTING



BRIDGE GRAFTING

(If the class has not done cleft grafting and budding, they should be included in this exercise.)

## EXERCISE No. 77

### PRUNING

**Object:** To learn how to prune fruit trees.

**Material:** Pruning shears, a saw, and a ladder.

**Method:** Prune an old tree by first cutting out all dead limbs, then prune it to a definite shape. In pruning small trees always cut to an outside bud, keeping in mind the shape of the tree during the next season's growth. Be sure you can give a reason for cutting each limb before the cut is made.

## EXERCISE No. 78

### BORDEAUX MIXTURE

**Object:** To make the Bordeaux Mixture.

**Material:** 4 pounds of copper sulphate (blue vitriol); 4 pounds of quick lime (not slacked); 2 barrels; wooden buckets; and a cheese cloth sack.

**Method:** Dissolve the copper sulphate by enclosing it in the cheese cloth sack and suspending it in warm water. Do not use an iron or tin vessel. Slack the lime in another vessel by adding a little water to it. Pour into each vessel enough water to make 25 gallons. Pour the two solutions together and the Bordeaux Mixture is made. When used for chewing insects add 3 pounds of arsenate of lead.

**Conclusion:** Bordeaux Mixture, 4-4-50.

**Note:** One-fourth of each of the above named ingredients will make a usable quantity.



## EXERCISE No. 79

### LIME-SULPHUR SPRAY SOLUTION

**Object:** To make lime-sulphur solution.

**Material:** 36 pounds of lump lime; 80 pounds of sulphur; iron kettle; and water.

**Method:** Slack the lime in the iron kettle and add enough water to make 50 gallons. Put a stick in the kettle and cut a notch in the stick to mark the height of the water. When the water begins to boil add the sulphur and stir until all the sulphur goes into solution, which is usually in about three quarters of an hour. Pour water in the kettle until it reaches the notch on the stick. This is the stock solution.

As a dormant spray, use 1 gallon of the stock solution to 8 gallons of water. As a summer spray, use 1 gallon of the stock solution to 30 gallons of water.

## EXERCISE No. 80

### STUDY OF DIFFERENT VARIETIES OF APPLES

**Object:** To study the characteristics of the common varieties of apples.

**Material:** The common varieties of apples.

**Method:** Fill out the following score card, using the exact terms to describe the peculiar variety of apples.

#### IDENTIFICATION OF VARIETIES OF APPLES

VARIETY.....  
FORM: Oblong, oblate, round, conic, flat, unequal, lopsided, oblong-conic.  
Horizontal section regular, irregular, ribbed, five-angled.  
SIZE: Small, large, very large, medium. (Exact size.)  
CAVITY: Depth, breadth; sides, abrupt, rounded, sloping, broadly flaring, regular or irregular, wavy, plaited; color, russet, green.

**STEM:** Long or short, slender or stout, club.

**BASIN:** Shallow, medium deep, deep, narrow, medium broad, broad, abrupt, rounded, sloping, flaring, smooth, regular, irregular, wavy, plaited, color if different.

**CALYX:** Large, small, open, half open, closed.

**COLOR:** Blush, washed, splashed, striped, stripes fine, regular or irregular, self colored.

**DOTS:** Color, white, gray, russet; round, irregular, areolar (russet dot surrounded by white or gray); sunken, raised, scattered, crowded.

**BLOOM:** Scant, moderate, abundant.

**SKIN:** Thin, thick, tough, brittle.

**FLESH:** Color; texture, hard or soft, coarse or fine grained, crisp, spongy, granular, dry or juicy.

**CORE:** Large, small, open or closed.

**FLAVOR:** Sour, subacid, mild subacid, flat, slightly sweet, sweet.

**QUALITY:** Very poor, poor, fair, fair to good, good, very good, extra.

**SEASON:** Time, when fruit is ready for table. Give month or season.

**TREE:** Hardy, short lived, large or dwarf, spreading or closed, good or poor bearer.

VARIETY	GRIMES	JONATHAN	DELICIOUS	WINSAP	DUCHESS	WEALTH	GREENING	SNOW	Etc.
Form.....									
Size.....									
Cavity.....									
Stem.....									
Basin.....									
Calyx.....									
Color.....									
Dots.....									
Bloom.....									
Skin.....									
Flesh.....									
Core.....									
Flavor.....									
Quality.....									
Season.....									
Tree.....									

## EXERCISE No. 81

### SCORING APPLES

#### SCORE CARD FOR APPLES (For Plate Exhibits.)

	POINTS	
1. Size (Normal).....	15	.....
2. Uniformity and Trueness to Type.....	25	.....
3. Color.....	20	.....
4. Texture and Flavor.....	20	.....
5. Freedom from Blemishes.....	20	.....
TOTAL.....	100	.....

#### EXPLANATION:

1. The apples should be of good size, but not overgrown for the variety. It is much better to have five apples of medium, uniform size than it is to have them of different sizes, even though part of them are large.

2. The five apples should be as uniform in size as peas in a pod. One should compare each apple with the others to see that they are alike in form and size.

In selecting trueness to type, one should know what the correct type is for the variety. Look over a number of the varieties and fix in mind the prevailing types.

3. The color should be the best obtainable for the variety. The apple should not be rubbed or polished as this destroys the natural bloom and may disqualify the apples when thus treated.

4. The time of picking and the care of handling have much to do with the texture. If the apples are to be kept any length of time after they are ripe they should be stored where a uniform temperature of 34° can be obtained.

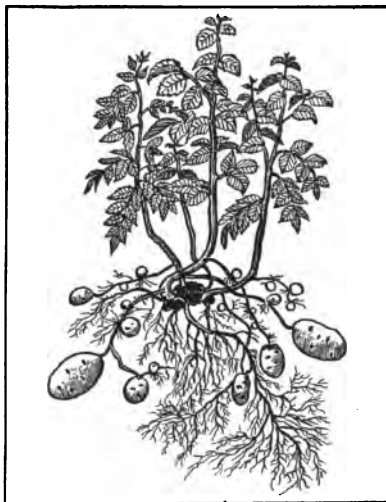
5. The apples should be free from all blemishes, such as worm holes or bites, limb bruises, hail marks, spray burns, and bruises in handling. The stem and calyx must be intact and they should be of the correct size and length for the variety.

## EXERCISE No. 82

### STUDY OF THE IRISH POTATO

**Object:** To become familiar with the most common varieties of potatoes.

**Material:** A good sample of the Early Rose or Early Ohio, Rural New Yorker, Cameron No. 3, Green Mountain or any other variety. Extension Bulletin 20, Ames, Iowa. (Do not select the best potatoes for this study.)



POTATO PLANT

**Method:** Describe each variety according to the following outline, using the bulletin as a guide to see if the variety is true to type.

# POTATO PLANT

POTATO PLANT				
1. VARIETY:	Early Rose	Rural	Cameron No. 3	Green Mountain
(a) Name.....				
(b) Early, medium or late.....				
2. SHAPE:				
(a) Cylindrical, oval, flat oval, long oval, irregular, com- pound.....				
3. SIZE:				
(a) Small, medium, large, uni- form or not uniform.....				
4. SKIN:				
(a) Color of skin: Whitish, yellowish, pinkish, reddish, other color.....				
(b) Surface: Smooth, wrinkled or rough.....				
(c) Condition of skin. Sound, cracked, cut in digging, worm eaten, sun burned, diseased				
5. EYES:				
(a) Abundance: Few, medium, many.....				
(b) Condition of eyes: sound, cracked, cut in digging, worm eaten, sun burned, diseased.....				
(c) Color of eyes: Yellowish, white, pink or russet.....				
6. GENERAL CHARACTERISTICS:				
(a) Clean, dirty.....				
(b) Smooth, tough, knotty.....				
(c) Scab, dry rot, blight.....				
FLESH:				
(a) Color: White yellowish, pink, blue.....				
(b) Texture: fine grained and crisp, flabby, and tough....				
(c) Soundness: Sound, hollow, diseased.....				

**Conclusion:** Is the sample described a good specimen of the type to which it belongs?

## EXERCISE No. 83

### SCORING POTATOES

**Object:** To learn whether or not a particular variety of potatoes is profitable from the farmer's standpoint.

**Material:** Different varieties of potatoes, such as Early Rose and Rural New Yorker, and a knife. (These samples should be taken from the garden earlier in the fall with notes kept concerning the hills from which they were taken.)

**Method:** Score each variety according to the following score card.

SCORE CARD FOR POTATOES

		POINTS
I. WILL THEY YIELD WELL? i.e., produce well.....	25	.....
1. Size of Tubers. Individual potatoes should be fairly large, indicating strength and constitution.		
2. Number in the hill. Hills with only a few good sized potatoes are undesirable, also hills with a large number of undersized potatoes.		
3. Compactness in the hill. They should be compact enough to gather easily, and spread enough to push out of the ground.		
II. WILL THEY SELL? (Are they what the market demands and are they attractive in appearance?)...	25	.....
1. Size. Potatoes should be large and of uniform size.		
2. Shape. Tubers should be similar in shape and free from deformities and irregularities.		

# SCORE CARD FOR POTATOES—Continued

		POINTS
3. Skin. Skin should be firm, clean, bright, and clear, uniform in color. A white skin, other things being equal, is preferable.		
4. Soundness. Potatoes should be free from scab, rot, sunburn and bruises, also from damages due to bad handling. They should not be hollow.		
III. WILL THEY COOK WELL AND ECONOMICALLY?.....	25	-----
1. Mealiness when boiled and-baked. Potatoes which are immature, large and coarse, or with a thin papery skin, and also those grown in heavy wet clay soils are liable to be soggy.		
2. Color when Cooked. They should have uniform, white color throughout and should not turn yellow or dark upon handling. Potatoes should be free from brown or blackish spots, and from dark or reddish streaks, especially near the stem and under the eyes.		
3. Evenness in Cooking. The different potatoes and the parts of each potato should cook quickly and uniformly. Potatoes which are hard and watery when cooked, or those having hard water spots, or with a tendency to be yellow will cook unevenly.		
4. Flavor. They should have a sweet, pleasing taste. Sunburned, sprouted, immature potatoes, or those which have been exposed to the light will have an undesirable flavor.		
5. Eyes. Deep or sunken eyes, and those protruding in clusters are objectionable, and cause a large loss in preparation for cooking.		
IV. Do THEY SHOW BREEDING?.....	25	-----
1. Trueness to Type. Indicated by the uniformity in size, shape, color and other characteristics of the tubers.		
2. Freedom from Mixture. A mixture of varieties is objectionable, because of difference in manner of growth, time of ripening and in keeping and storing qualities.		

## EXERCISE No. 84

### DRAWING OF A POTATO

**Object:** To make a detailed study of the general appearance, eyes, and flesh of the potato.

**Material:** Early Rose or Rural New York potatoes, knife, hand lens, and iodine solution.

**Method:** Make a drawing 3 inches in diameter of the surface of two potatoes showing general appearance and eyes of the potatoes. Make a large detailed drawing of an eye of each potato and label as per diagram.

No. 1. The line beneath the eye or line yolk.

No. 2. A leaf point or mid rib

No. 3. Eye blinds.

No. 4. The sprout tips the color of which is a means of tuber identification.

No. 5. Side sprouts.

Cut each potato into halves and make drawing to show structure.

Pour a few drops of iodine solution on a half of each potato and make drawing to show where the starch is located and where most abundant.

**Conclusion:** Describe the general appearance of a good potato.....

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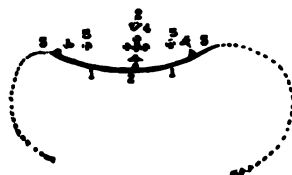


DIAGRAM OF POTATO EYE





## EXERCISE No. 85

### HOT BED

**Object:** To become familiar with the dimensions of a hot bed.

**Material:** Drawing paper and the dimensions of the hot bed.

**Method:** Make a drawing of the hot bed. Draw to a scale.

## EXERCISE No. 86

### PLAT OF A GARDEN

**Object:** To keep a record of a garden layout.

**Material:** Stakes, string, hammer, and a 50-foot tape line.

**Method:** Make accurate measurements of the size of the garden and of the individual plots.

Make a neat drawing of the garden locating each plot and labeling it with the kind of vegetables planted on it.

## RECORD OF A GARDEN

**Object:** To determine the time and cost of raising a garden crop.

**Material:** Garden tools, and a record book.

**Method:** Make a record of the time worked in the garden and the tools used, the cost of spraying, and the time and method of preparing the products for market. This record should be accurate. The exact expenses subtracted from the returns will give the gain or loss on each product.

**Conclusion:** The results of the garden work.

(This exercise will require several laboratory periods.)

[illegible]

70 1941  
1940-1941

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## FOREST TREES

**Material:** Forest, wood lot, and park.

**Conclusion:** Write a descriptive sentence by which each tree can be identified.

[illegible]

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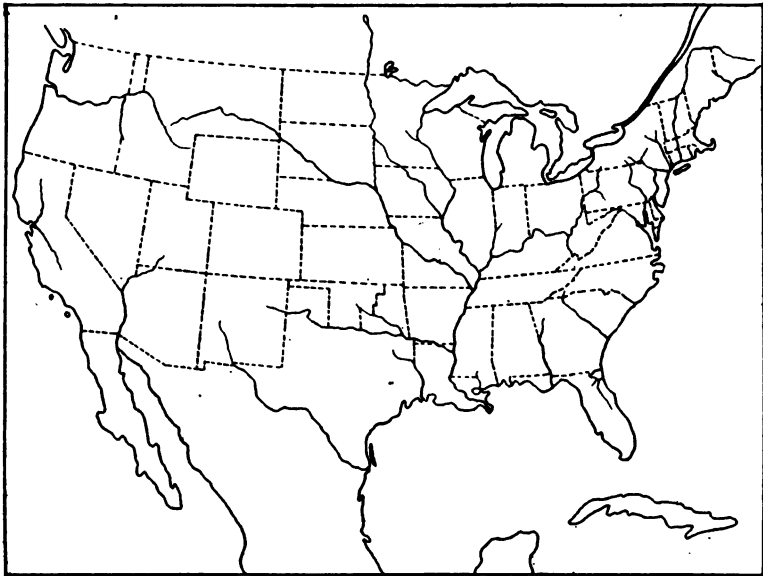
**EXERCISE No. 89**

**FOREST MAP**

**Object:** To learn the forest area of the United States.

**Material:** Outline map and a map of the forest area of the United States.

**Method:** Locate by red lines the forest areas of the United States.



**OUTLINE OF MAP OF UNITED STATES**

# **EXERCISE No. 90** **A STUDY OF WEEDS**

**Object:** To become familiar with the common weeds of your community.

**Material:** Pasture field, meadows, the roadside, and Farmers' Bulletin No. 660.

**Method:** Go out into the fields with a note book or collect the weeds on the trip and fill in the outline after returning to the laboratory.

Name of Weeds	Annual Biennial Perennial	Prope- gation by Seeds Roots or Tubers	Time of Flower- ing Color of Flower	Time of Seeding	Place Where Grown	How Con- trolled
Quack grass.....						
Canada thistle.....						
Wild morning glory.....						
Buck plantain.....						
Yellow dock.....						
Wild mustard.....						
Buffalo bur.....						
Burdock.....						
Chick weed.....						
Pig weed.....						
Milk weed.....						
Iron weed.....						
Smart grass.....						
Dandelion.....						
Crab grass.....						
Dog fennel.....						
Blue vervain.....						
Rag weed.....						
Prickly lettuce.....						
Oxeye daisy.....						
Wild carrot.....						
Sorrel.....						
Jimson weed.....						
Wild oats.....						
Etc.....						

## EXERCISE No. 91

### IDENTIFICATION OF WEED SEED

**Object:** To become familiar with the common weed seeds.

**Material:** Samples of the common weed seeds, weed seed chart, and some grain mixed with various weed seeds.

**Method:** Pick out the different weed seeds in the given sample and identify them by the different samples or charts. Pick out at least ten of each of the common weed seeds found in the sample.

**Conclusion:** Give the names and make drawings of the various weed seeds to fasten in the mind their comparative sizes and shapes.

## EXERCISE No. 92

## BIRDS

**Object:** To become acquainted with the common birds.

**Material:** Woods, fields, a bird book, bird glasses, and Farmers' Bulletin No. 630.

**Method:** Take a trip in the fields or forest to study the birds. Learn the economic value of the birds seen on the trip by studying them in their natural habitat. Find out what foods the birds seen on this trip live on.

**Conclusion:** What are the foods of the birds seen on this trip? In what ways do they benefit the farmer?.....

[illegible]

## EXERCISE No. 93

### COLLECTING INSECTS

**Object:** To learn the habits of the common insects.

**Material:** The fields, an insect net, and a potassium cyanide jar.

**Method:** A field trip studying the insects in their natural habitat. Look for their homes and see if you can learn how they spend their winter. Use the potassium jar to preserve any insects for further study.

**Conclusion:** Which insects found get their living by biting and which ones by sucking?.....

How are each controlled?.....What  
crops are being destroyed by the different insects found on  
the trip?.....About what per cent of  
the crops are being destroyed by insects?.....



## EXERCISE No. 94

### MOUNTING INSECTS

**Object:** To learn to label and to mount insects properly.

**Material:** Insects, labels, pins, and mounting boxes.

**Method:** Make a general classification of the insects from the standpoint of those that injure the same kind of grain or fruit. Label them and place them in a box for future school use. (Each class should add some to the collection.)

**Conclusion:** What is the best way to preserve insects for future use?.....

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## EXERCISE No. 95

### A FARM LAYOUT

**Object:** To learn to lay out a farm.

**Material:** The plat of a farm in the community. See Boss' Farm Management, Chapter VIII.

**Method:** Draw a plat of the farm as it is and as it should be. Then draw plats of an 80 and a 160 acre farm.







## EXERCISE No. 96

### STOCK ACCOUNT

**Object:** To learn how to keep accounts with stock.

**Material:** A farmer buys a carload of feeders on Sept. 10, 1915. The steers average 1200 pounds. He pays \$0.0725 per pound. The first period of 30 days he feeds them an average of 1 pound of cotton seed meal, 5 pounds of corn, 12 pounds of silage, and 18 pounds of clover hay. During the second period of 30 days he increased the cotton seed meal to 2 pounds and the corn to 8 pounds a day. During the third period of 50 days he increased the cotton seed meal to  $3\frac{1}{2}$  pounds, the corn to 12 pounds, and the silage to 18 pounds a day. During the first period the cattle gained 1.8 pounds a day, during the second period they gained 2.3 pounds per day, and during the third period they gained an average of 2.9 pounds per day. He sold them for \$0.089 per pound. The price of corn was \$0.50 per bushel of 70 pounds, cotton seed meal was \$30 per ton, clover hay was \$10 per ton, and silage was \$3.50 per ton. Interest was worth 6%.

**Method:** Make up a record of this venture as it should be found in your farm account book if you were the farmer.

**Conclusion:** What were the average profits on each steer?.....On the carload?.....

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## EXERCISE No. 97

### CROP ACCOUNT

**Object:** To learn to keep accounts with crops and to determine the profits.

**Material:** Twenty-five acres of corn. The land is worth \$150 per acre and interest is 6%. The field was plowed September 15th, at a cost of \$1.50 per acre. It was harrowed on the 16th of September at a cost of \$0.20 per acre. On April 24th the land was double-disked for \$0.50 per acre. The field was harrowed on April 28th at a cost of \$0.25 per acre. The seed corn was worth \$2 per bushel and it required one bushel to plant 6 acres. The seed was tested for \$0.05 per acre. On May 10th the corn was planted for \$0.40 per acre. On the 11th it was harrowed at a cost of \$0.25 per acre. The corn was cultivated on May 25th at the rate of \$0.35 per acre. It was again cultivated on June 5th, June 15th, and June 25th. Each cultivation cost \$0.35 per acre. Four bushels of seed corn were harvested September 1st. The other corn was harvested September 15th. It cost \$0.045 per bushel to harvest it. The yield per acre was 70 bushels, and was worth \$0.60 per bushel. The depreciation of the machinery was \$0.25 per acre.

**Method:** Make a record of this venture as it should be found in your farm account book if you were the farmer.

**Conclusion:** What was the profit from the 25 acres?

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Handwriting practice lines consisting of 25 horizontal dashed lines.





## FARM ACCOUNT

**Material:** The data from farm records.

**Conclusion:** How much was gained or lost on the farm during the year?

[illegible]



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Handwriting practice lines consisting of 25 horizontal dashed lines.





## A COUNTRY YARD

**Conclusion:** The cost of beautifying the yard.

[illegible]





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EXERCISE No. 100

**LAYOUT OF A FARMSTEAD**

**Object:** To learn to plan the arrangement of the farmstead.

**Material:** Ruler and model farmstead plan book. (See Boss' Farm Management Chapter VIII.)

**Method:** Draw to scale the location of all the buildings, fences, lots, and trees on 2 model farmsteads.

**Conclusion:** The plan accurately and neatly drawn.



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